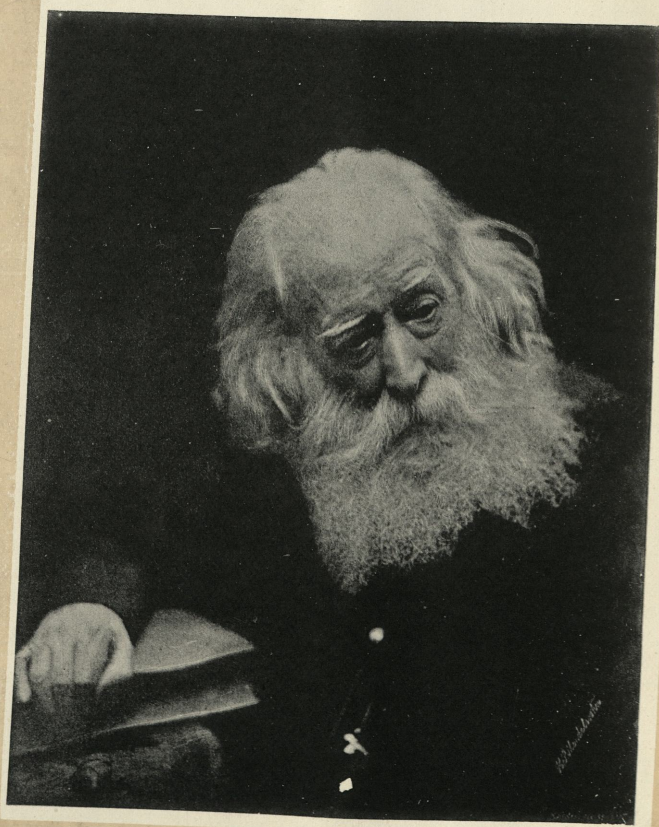# Henry Perigal F.R.A.S., &c.

A Short Record of his

Life and Works . .

Extracts from his Diaries,

and

Reprints of occasional Notices and Obituaries

from Scientific and other Publications,

accompanied with

Illustrations of Specimens

of a few of his Designs,

both by the Bow-Pen and Lathe.

Prefatory Remarks.

✦

The following slight Memoir of my late Brother has been prepared, not only as containing interesting information respecting him, but likewise as showing the kind feeling entertained towards him personally by those with whom he became associated during his lengthened career.

As regards the value of his scientific labours and discoveries—especially those relating to the Laws of Circular Motion—it would require a Specialist to examine and arrange the large mass of manuscripts and printed papers, which he has left, in order that an adequate opinion of their several merits might be formed; this would be very laborious, and I am quite incompetent to attempt such a task.

F. Perigal.

May, 1901.

HENRY PERIGAL.

CHAPTER I.

THE subject of this Memoir, was born at 41, Newington Place, near Kennington Common—which was then a playground—where, as a boy, he used to fly kites, play cricket, and practice archery, a pastime at that period in vogue, and which had been formerly much cultivated there, the Parish being named "*Newington Butts,*" on account of the targets established in that neighbourhood in 1558. He was educated at a private school at Kew, kept by a Mr. Day, of Oxford.

Mr. PERIGAL's father was of Norman descent,* his branch having escaped to England in 1688, after suffering much persecution as Huguenots; his mother's family were Milesians, through a long line of Irish ancestry.

Mr. PERIGAL was of an enquiring mind from early youth, and interested in any ingenious device; in those days a bicycle had been constructed, similar in appearance to those now so common, but instead of having treadles, the seat was so placed that the feet were able to touch the ground alternately, by which means the rider could proceed rapidly, the machine being termed a " Velocipede," and was vulgarly called *a dandy horse*; he, of course, took pleasure in riding one. He early possessed an electrical machine, which was in those days only a scientific toy, and he was fond of making numerous experiments with it. He was in the habit of drawing circles with a pair of compasses, which practice he continued from early life till his last year, so that he naturally became a great adept in designing a great variety of beautiful curves, and while so engaged he studied their combination,

* See page 55.

and subsequently, by the aid of the Geometric Chuck, he investigated and illustrated the system of curvilinear motion to a considerable extent. Mr. John Holt Ibbetson—the inventor of that Chuck—was a great friend of the family, and Mr. PERIGAL was much at his house, engaged with him in ordinary lathe work, as well as in studying the capabilities of his new Chuck, resulting in Mr. PERIGAL becoming an accomplished amateur turner, and likewise in his designing additions and improvements to that instrument, the complex powers of which he so well understood.

As Mr. PERIGAL increased in years, he became more and more engaged in the pursuit of knowledge, and devoted his attention to science of all kinds, and, as his means allowed, he joined various societies, attending their lectures and discussions, so that in the course of his career, he became a fellow or member of the principal scientific societies,* and inasmuch as his presence at such meetings was of frequent occurrence, his personality became well known, and he acquired a large circle of valued friends and acquaintances, for his genial and kindly disposition and general character were so well established, that he obtained the goodwill and esteem of the very extensive circle of those he associated with.

Mr. PERIGAL became well known for many years under the name of "*Cyclops*," which was given to him by a lady friend in mistake for "*Cycloids*," a word she had frequently heard mentioned in connection with his name, which lady he consequently called his Godmother.

Mr. PERIGAL was the first-born of his generation, and having been baptised with the same name as his father—who lived till his 100th year—he had to sign "junior" after his name until he became upwards of 66 years of age.

Mr. PERIGAL was a bachelor all his life, although he would have gladly married had he been able to support a wife and family; he had a very affectionate and domestic disposition.

* See a list thereof at page 15.

In his early years Mr. Perigal only held temporary appointments, one being as a Clerk in the Victualling Department of the Royal Navy, as a substitute for an absentee; after which he served for two years in a similar capacity at the Privy Council Office; at last, he was offered a situation as Book keeper by a friend who was a Stockbroker, in which position he remained for 44 years, when he resigned the appointment in order to devote all his time to scientific pursuits, he being then 87 years of age.

Mr. PERIGAL was economical and sparing with regard to his own living, but very liberal in assisting others; he spent large sums in printing papers, with blocks to illustrate his discoveries, also in models to explain his views, and he was liberal in giving away specimens of his turning, and of his bow-pen drawings, as well as the numerous prints of circles produced by his Geometric Chuck.

Mr. Perigal was desirous of being elected a Fellow of the Royal Society, believing that his investigations in curvilinear motion; his mechanical contrivances; and his services in various branches of science, entitled him to that distinction; but he was aware that his known opinions, respecting certain dogmas relating to Astronomy—not being orthodox—would be likely to militate against his admission; and so it proved when his name was put to the vote (when it is probable that many of his personal friends voted adversely); he was naturally disappointed with the result, but observed that his possessing an open mind in all questions, and not adopting doctrines without his judgment assented thereto, should be a reason in his favor, instead of against him.

Mr. PERIGAL was always fond of puzzles and problems of all kinds, and he projected some himself; when the American "15 puzzle" came out, he sat up the whole night in order to solve it; on other occasions, when interested in any question, he would often neglect his meals, or would stay up for long periods to continue his investigations, and in his later years he had become so accustomed to late hours, that his friends, when he visited them, had to remind him that he would lose the last train or omnibus, if he remained longer

at their house; he would sometimes fall asleep while returning homewards, and on one occasion he woke up in a steamboat when it was being moored for the night in the middle of the Thames; he has, at other times, been carried beyond the station where he should have got out of a train.

Mr. Perigal kept a Diary for 35 years, from which are the following extracts—showing his usual employments:—

1854.

Feb. 13—Auditing the Accounts of the Microscopic Society.

,, 15—Knocked down by a cart and nearly run over— only bruised and dirtied.

April 8—Mr. Huggens de Lowendal called on me, to consult me about an Ore Crushing Machine.

June 3—Attended Annual Visitation at Greenwich Observatory.

,, 13—Made Table of Fractions for Bicircloid engraving.

Sep. 22—Dined at Swaynes, and brought back my Guitar, which they had borrowed years ago.

Oct. 9—Creedy with me $4\frac{3}{4}$ hours, working at Table of Ellipses.

Nov. 27—Attended Chelsea Savings Bank, as President for the evening.

1855.

Feb. 28—Eve at Microscopic Meeting, when I was elected on the Council.

Mar. 6—Eve at Chronological Society, auditing the Treasurer's accounts.

May 18—Malone took me to Hanneman's, to sit for my portrait.

1856.

June 24—Called at Photographic Company, and had portrait taken of my Selenescope for Magic Lanterns.

Dec. 19—Tea at Brookes, as one of a committee for investigating Microscope screw adjustment.

,, 23—In the evening gave a lecture on the Moon question, at the Literary Institute, at Gloucester, for Jelinger Symons.

1857.

Dec. 23—Called on May, respecting a patent cause in which he wished my assistance.

1858.

Dec. 3—Received £3 3*s.* 0*d.* as consultation fee, respecting patent for " Whirlpool Cloth."

„ 5—Tabulating functions of right angled triangle.

1859.

Mar. 20—Went to Hammersmith, and had tea and four hours talk with Professor Wheatstone.

„ 27—Arranged Medal Ruling Machine.

Apl. 18—Joined Microscopic Committee at Dr. Lancaster's, arranging for a Soirée, &c.

May 5—At 4, I proceeded to the South Kensington Museum, to assist in preparations for the Microscopic Soirée, with Dr. Lancaster to receive the visitors—2,850 attended.

„ 8—Had a capital view of the occultation of Saturn, no sign of Lunar atmosphere.

Aug. 13—From 10½ to 3¼ at Wildberg Company, auditing the Accounts.

Oct. 21—Attended (as Treasurer of the Meteorological Society) the funeral of Robert Stephenson in Westminster Abbey.

Nov. 4—Compiling Table of Bicircloids.

Dec. 10—Attended at Beaufort House, where I met Fred, when both joined the S. Middlesex Rifles ; he as an effective, I as an honorary member.

„ 19—Arranging new cabinet for stereos, photographs, &c.

1860.

Feb. 2—Audited Accounts of Astronomical Society with Drach.

Apl. 14—Worked at the Geometric Chuck.

„ 26—Darker called for clock, to complete Ruling Machine.

May 7—Eve at Deacon's, gave him 200 engravings of curves.

„ 19/20—Writing a paper on geometric orbits of planets.

June 22—Dined with Society of Arts, at St. James's Hall, with Glaisher, Sopwith, &c., B. Disraeli in the chair.

Aug. 3—Tabulating loop-touching Bicircloids.

„ 24—Attended Wildberg & Co. from 2 to 6, to audit the Accounts.

„ 26—Working at geometrical dissections.

1860.

Sep. 21—To Plymouth.

,, 26—Was launched in H.M. Sloop "Pantaloon."

,, 28—Saw 4,000 men paid their wages in 20 minutes.

1861.

Feb. 1—Model of the Great Pyramid arrived from Cairo.

,, 13—Meeting of Microscopic Society, when I was re-elected on the Council.

Mar. 3—Studying Parabolic Tetra Circloids.

,, 10—Studying Roots of Equations.

Nov. 7—Worked till 1 a.m. at the Integrant Theory.

Dec. 8—Kinematic Sinoids.

1862.

July 19—My father's 94th birthday, when he played ½ a dozen rubbers at whist.

Sep. 17—To Crystal Palace, to accompany Glaisher in a balloon ascent, but found he had settled not to go, on account of the wind being too boisterous.

Oct. 5—Rectification of the circle, &c.

1863.

May 11—Revising List of right-angled Triangles.

1864.

June 11—Attended De-la-Rue's Soirée, as President of Astronomical Society, where I exhibited the Geometrical Chuck, and was introduced to Cardinal Wiseman.

1865.

Jan. 13—Dined with the Astronomical Club; after dinner, the question as to the moon's rotation was put to the vote, when the numbers were: 10 for Adams and rotation, and 11 for Perigal and non-rotation.

Mar. 16—In evening, at the Royal Society, to meet Professor Sylvester, on a proposition to assist him in getting a model of a Geometric Curve, &c.

,, 17—To town by 'bus, where I met Mr. Sadler, who recognised me, though I had not seen him for 44 years.

,, 18—Kept an appointment with Sylvester and Dr. Hurst, to consider the best method of modelling his analytical curve.

1865.

May 24—Elected a Member of the Civil Service Club.   N.B.—
(the club house having been built on the site of the
old "Thatched House Tavern," where he had dined
with the Astronomical Society Club on 12 Feb.,
1858).

June 13—In the evening, at the Syro-Egyptian Society, where
I announced my discovery of the geometrical con-
struction of the Great Pyramid.

Dec. 7—At Evan Hopkins, to revise his paper on Magnetism.

1866.

Nov. 13—Watched "Shooting Stars" from 12 to 2½ from my
windows.

Dec. 15—Spent the evening and night at Buckingham Obser-
vatory, and did not get home till 3½ a.m.

1867.

June 10—Dressed in my Fancy Ball costume to have my
photograph taken by Melhuish.

„ 30—Henry Northcott called for explanations of geometrical
curves—he remained 2 hours.

Nov. 3—Discovered curve Pent-Hept-tomoid.

„ 8—Dined at the Astronomical Club, where I announced
my discovery of the property of Dis-orthoid Curves.

„ 28—Had tea with De Morgan, showed him my Polygonal
Curves.

1868.

Feb. 27—At Mathematical Society, where I was admitted a
Member.

July 6—Eve at Dr. Wilson's, to whom I gave diagram of
rectangle and mean proportional, proved by the
transposition of parts.

Aug. 11—Made ascent 1,500 feet in captive balloon, too hazy to
see the distant prospect.

1870.

Sep. 17—Had my pocket picked of watch.

1872.

May 11—Called on Roberts, and gave him list of Tetro-
Circloids, producing the finite retrogressive Para-
bola, and explanations.

1872.

Oct. 24—Writing a paper on geometric dissection and transfers, for the " *Messenger of Mathematics.*"

1873.

Nov. 25—In eve, to audit the Accounts of Mathematical Society.

1874.

Jan. 8—In eve, at the Mathematical Society, when I announced that " Paucellier's links " are " Jopling's double cranks."

Dec. 10—Took specimens of geometric designs, for ladies' work, to the Amateur Mechanical Soirée.

1875.

Jun. 12—Attended the Annual Meeting of the "Association for improving Geometrical teaching."

1876.

May 19—At conference and exhibition of Loan Collection at South Kensington.

July 8—Demonstrated my Parabola, Chuck, &c., at the Loan Exhibition for one hour.

Aug. 12—On returning home through Seven Dials, my watch, chain and whistle were violently wrenched from me.

1877.

June 15—Called at Longman's with blocks for Proctor's book.

1878.

Jan. 15—Received Proctor's book on Cycloids, &c.

Apl. 15—To the Royal Institution, where I exhibited my Bow-pen drawings.

,, 24—Scales, &c., for investigating curves.

Dec. 9—To the Amateur Mechanic Soirée, where I exhibited my " Kinematic paradox."

1879.

Apl. 9—Dined with Astronomical Club, where I showed my Anglo-Hindoo Puzzle.

,, 30—Eve at Royal Society Soirée, where I showed my Geometric Puzzle to Mr. Gladstone.

May 2—Eve at Royal Institution, where I exhibited the Geometric (automatic) Puzzle.

June 13—Wrote letter to Royal Astronomical Society, presenting two Rotameters.

1879.

June 28—To Physical Society, gave to Professor Ayrton a set of my " 3 curves."

Oct. 21—To meeting of Islington School Proprietory.

Nov. 1—To Cambridge—called on Cayley, to whom I showed my Ovalites, &c.

1880.

Dec. 10—Dined with the Astronomical Society, where I exhibited my Rotameter, in explanation of the errors in the present system of Astronomy.

1881.

June 16—Called on Boord to purchase the triple Geometric Chuck, that was made for Sir Charles Taylor, on my principles, for £50—it had cost £120.

Dec. 31—Dined with the Glaishers, showed them my verses on the present system of Astronomy.

1882.

May 1—Made a working drawing of Kinegraph.

1883.

Feb. 26—(At Cambridge.) Drew diagrams for Miss Scott, and took them to Girton College; Miss Coulden and I had tea with Miss Scott and Miss Perrin.

July 27—(At Leeds.) Teasdale took me to the studio of M. C. W. Flower, where we spent the day, having my portrait painted by the latter.

1884.

Apl. 1—Called on Evans to explain Transfer Mandril.

May 7—To the Gresham Lecture on Astronomy, by Ledger; explained to the Lecturer, Foucault's pendulum delusion.

1886.

Apl. 8—Mr. Gladstone proposed the repeal of the Union with Ireland ! ! !

May 27 & 29—(At Leeds.) Sat to Miss Goodall for my portrait.

June 29—Evans called about my " Compensator for Ellipse Cutter." (Ash's).

1887.

Jan. 31—Dined with the Members of the Photographic Society, who presented a Marble Bust to Glaisher for a Testimonial, he having been President for 16 or 18 years.

Mar. 8—At the Photographic Society, Mendelssohn was introduced to me by Glaisher, and requested me to let him photograph me.

Apl. 1—My birthday—86—called at Mendelssohn's, to have photo. taken.

Nov. 8—Had a bad fall.

  ,, 20 to *Dec.* 5—At home, and much in bed, consequent to the fall.

  1888.

Nov. 2—Took leave of my colleagues, having resigned, in order to devote myself to my scientific pursuits, after $44\frac{1}{4}$ years with H. Tudor & Son.

  1889.

Feb. 24—Flower called and requested me to sit to him for my portrait.

Mar. 5—Flower sketched my portrait.

N.B.—And on 20 days subsequently, until May 30, Mr. PERIGAL sat again, resulting in the production of a very excellent likeness.

On 30th June, H. PERIGAL ceases to keep a record in his Diary.

List of Societies H. PERIGAL belonged to.

	Date of Membership.
ROYAL ASTRONOMICAL	*Feb.* 8, 1850.
ROYAL ASTRONOMICAL SOCIETY'S CLUB ...	*June* 17, 1853.
BRITISH ASTRONOMICAL ASSOCIATION ...	*Nov.* 15, 1890.
AERONAUTICAL SOCIETY OF GREAT BRITAIN...	*Feb.* 12, 1866.
SOCIETY OF BIBLICAL ARCHÆOLOGY	*April* 1, 1873.
CAMERA CLUB	1889.
CHRONOLOGICAL INSTITUTE OF GREAT BRITAIN,	*April* 27, 1852.
ASSOCIATION FOR THE IMPROVEMENT OF	
GEOMETRICAL TEACHING	1874.
HUGUENOT SOCIETY OF LONDON	*Nov.* 9, 1887.
LONDON INSTITUTION	*Jan.* 9, 1845.
LONDON MATHEMATICAL SOCIETY	*Jan.* 21, 1868.
AMATEUR MECHANICAL SOCIETY	*Jan.* 1, 1869.
ROYAL INSTITUTION	*May* 6, 1895.
ROYAL METEOROLOGICAL SOCIETY ...	*June* 4, 1850,
ROYAL MICROSCOPIC SOCIETY	*Jan.* 28, 1852.
QUEKETT MICROSCOPICAL CLUB	*July* 22, 1881.
ROYAL PHOTOGRAPHIC SOCIETY OF GREAT	
BRITAIN	*Feb.* 3, 1853.
PHYSICAL SOCIETY OF LONDON	1875.
SOCIETY OF ARTS	*April* 17, 1823

He was an original Member of some of the foregoing, assisted in their formation, and had been on the Council of several of them.

He was likewise connected with the—

INVENTOR'S INSTITUTE, as a Member.

THE ISLINGTON PROPRIETARY SCHOOL, as a Proprietor.

THE SCIENTIFIC CLUB, as a Member.

THE AMATEUR TURNER'S CLUB, as a Member.

WEST LONDON LITERARY AND SCIENTIFIC ASSOCIATION, as a Member.

CRYSTAL PALACE COMPANY, as a Proprietor.

CHELSEA SAVINGS BANK, as a Director.

CIVIL SERVICE CLUB, as a Member.

BUSHEY CLUB, as a Member.

SOUTH MIDDLESEX VOLUNTEER RIFLES, as a Hon. Member.

During the later years of his life, he was accustomed to receive visits from many of his relatives and friends on each anniversary of his birth, which always gave him much pleasure, and in 1896, he was especially gratified by the presentation to him of a handsome Album, containing the cabinet photographs of upwards of 50 of his scientific friends.

On the cover containing it, was written—

" Presented by a few friends
With all kind wishes and birthday congratulations to
HENRY PERIGAL, EsQRE.,
Fellow of the Physical Society,
The Quekett Club, Camera Club, &c., &c., &c.,
On the occasion of his completing his
NINETY-FIFTH YEAR.
April 1st, 1896."

On the inside—

" Presented to HENRY PERIGAL
by his friends, who wish him health
and happiness on his 95th birthday."

The Portraits in the Album being*

Captain Sir WM. ABNEY, F.R.S., &c.
Captain BARKER, of the Training Ship " Worcester."
Sir T. W. BOORD, Bart., J.P.
A. BREWIN.
T. BUCKNEY.
G. CHATTERTON, Civil Engineer.
W. H. M. CHRISTIE, M.A., C.B., F.R.S., &c. Astronomer Royal.
H. W. CHRISTMAS, The Servian Consul General.
LATIMER CLARK, F.R.S., &c., &c. Past President Electrical Engineers.
A. W. CLAYDEN, M.A., F.R.A.S., &c., &c.
CONRAD W. COOKE, Electrician, Fellow Physical Society, &c.

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* The Compiler has arranged the names in alphabetical order, but does not know all the titles and professions of these friends of Mr. Perigal.

The Earl of Crawford and Balcarres, K.T., F.R.S., LL.D., &c.

H. E. Davis.

A. Deed.

Edwin Dunkin, F.R.S., &c   Astronomer.

Jas. Edmunds, M.D., Medical Officer of Health.

Wm. Ellis, F.R.S., &c., late Superintendent of the Magnetical and Meteorological Department, Greenwich.

Rev. C. E. Ellison.

Professor G. C. Foster, Professor of Natural Philosophy, &c., &c.

Professor J. H. Gladstone, Ph.D., D.Sc., F.R.S., Past President of the Physical Society.

Charles Hawkesley, Civil Engineer.

Hubert Herkomer, Royal Academician.

A. Hilger, F.R.A.S.

Colonel H. Holbeche, on Committee of Camera Club.

Professor D. E. Hughes, F.R.S., &c.; has many Foreign Orders, Past President of Electrical Engineers, inventor Microphone, &c., &c.

Richard Inwards, F.R.A.S., Civil Engineer, F.R.Met. Society (Past President), and an excellent amateur Mechanic.

Lord Kelvin, The Rt. Hon. (Sir Wm. Thompson), G.C.V.O., M.A., LL.D., D.C.L., F.R.S., &c. Professor of Natural Philosophy, Past President of the Physical and of the London Mathematical Societies, &c., &c.

E. B. Knobel, C.B., F.R.A.S., and President thereof.

R. Lecky, Civil Engineer, F.R.A.S.

Vice-Admiral J. P. Maclear, was Commander of H. M. S. "Challenger," during her scientific voyage, 1872-6.

Marriott, Wm., Asst.-Sec. Royal Meteorological Society.

Dr. H. H. Massey, M.R.C.S., L.S.A.

E. Mawley, Past President Royal Meteorological Society, and one of its Secretaries.

H. R. Mill, D.Sc., Vice-President Royal Meteorological Society, Librarian Royal Geographical Society, &c.

Captain W. Noble, F.R.A.S., &c., first President of the British Astronomical Association.

Admiral Sir ERASMUS OMMANNEY, C.B., LL.D., F.R.S. An Arctic voyager, and seen much service.

W. H. PREECE, C.B., F.R.S., &c., &c., an Electrician, Engineer-in-Chief at General Post Office, &c.

LORD J. W. S. RAYLEIGH, D.C.L., LL.D., F.R.S., &c., &c. Was Senior Wrangler in 1865, and has done much good service in various departments of science.

J. L. SAMPSON, Civil Engineer.

Colonel J. G. SANDEMAN, was on the Council of the Amateur Mechanical Society, a distinguished officer, having served in many campaigns.

W. SCHOOLING, an Actuary. Sec. to the British Astronomical Association.

R. A. SCOTT, M.A., F.R.S., F.G.S., D.Sc., Past President Royal Meteorological Society, &c., &c.

H. J. SLACK, Barrister-at-Law, late Sec. to the Royal Microscopic Society.

BASIL WOODD SMITH, F.R.A.S., F.R.M.S., J.P., one of the Managers of the Royal Institution.

Mrs. GEORGE SMITH.

A. SOUTHALL.

Professor HENRY SPOONER, C.E., F.R.M.S., F.G.S., M. Inst. M.E., &c., Director of Polytechnic School of Engineering.

Sir GEORGE G. STOKES, Bart., F.R.S., D.C.L., LL.D. Was Senior Wrangler in 1841. Past President of the Royal Society, and in 1869 was President of the British Association. Has received several foreign honors, and done much good scientific service.

E. J. STONE, M.A., F.R.S., F.R.A.S. Was H. M. Astronomer at the Cape of Good Hope. Has contributed many valuable papers on Astronomy, including a systematic catalogue of 12,441 stars of the Southern heavens.

AUGUSTUS STRÖH, M.R.I., M.I.E.E. Was a manufacturer of scientific instruments, and sold his factory to the Government, when they undertook the working of the telegraph.

He is an excellent amateur photographer, and arranged the Album presented to H. PERIGAL.

J. W. SWAN, M.A., F.R.S., Past President of the Institution of Electrical Engineers; inventor of the Incandescent Electric Lamp, bearing his name; invented the modern dry plate, which revolutionized photography, &c., &c.

G. J. SYMONS, F.R.S. He organized the British Rainfall System, which now includes nearly 3,000 observers, the results having been published in 33 special vols., and in 28 vols. of the Meteorological Magazine, compiled and edited under his direction. He was Past President of the Royal Meteorological Society, and for many years its Hon. Secretary. He was Chairman of the Committee appointed to report upon the eruption of Krakatoa. He was on various International Committees, mostly on Meteorological subjects. He received the Cross of the Legion of Honour—and rendered excellent service in various important matters.

WASHINGTON TEASDALE, F.R.A.S., Member of the Royal Astronomical, Quekett, Camera, and other Clubs. Past President of the Leeds Astronomical Society, &c.

Professor SILVANUS P. THOMPSON, F.R.A.S., D.Sc. On the Council of Institution of Electrical Engineers; Vice-President of the Physical Society. Professor Thompson materially aided Mr. Stroh in collecting the photos. for the Album. He has made numerous scientific researches in electricity, magnetism, optics and acoustics.

Professor H. H. TURNER, M.A., F R.S., B.Sc., &c. Savilian Professor of Astronomy, Oxford University, was Chief Assistant at the Royal Observatory, one of the Secretaries of the Royal Astronomical Society.

J. J. VEZEY, F.R.M.S., F.R.P.S., Member of the Royal Institution, also of the Society of Arts, British Astronomical Association, Rompjen Society, and Japan Society.

C. W. VINCENT, F.R.S.E. Assistant Secretary and Keeper of the Library of the Royal Institution. Editor of the recent editions of Haydn's Dictionary of Dates.

T. H. WEBB, Hon. Sec. to the Institution of Electrical Engineers.

S. B. WEBBER, Member of Camera Club, and skilful photographer.

W. H. WESLEY, Asst. Sec. of the Royal Astronomical Society.

T. CHARTERS WHITE, M.R.C.S., L.D.S., F.R.M.S. Past President of the Quekett Microscopical Club.

T. B. WINSER. Was Actuary of the Royal Exchange Assurance Corporation. Was on the Council of the Amateur Mechanical Society. Author of "The Microscope and how to use it."

N.B.—One or two photos. arrived after the Album itself.

Many other celebrities would have sent their photos.; had they known of the intended presentation.

Several of those sent were accompanied with kind letters.

Mr. James Glaisher, F.R.S. &c., &c. (one of Mr. PERIGAL's oldest friends), sent a print of himself, not having a spare photo. of the cabinet size.

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Mr. PERIGAL had for many years made it known to the members of the family, that he should be cremated, which was done in accordance with his expressed wish; his ashes being subsequently interred in the Churchyard of Wennington, in Essex, an appropriate service being read at the grave by his cousin, the Rev. Nicholas Brady, M.A., the Incumbent of that parish, who had previously read the burial service in the Chapel attached to the Crematorium.

CHAPTER II.

The following are public notices of Mr. Perigal, at various times during his lifetime, and as obituaries after his death.

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Mr. PERIGAL used to be invited to Hartwell House, the residence of Dr. Lee, a celebrated Scientist, and on 3rd August, 1855, the Report of the " *Scientific Gathering at Hartwell House, Aylesbury,*" contained the following :—" Mr. PERIGAL, exhibited " a series of figures of mathematical curves, engraved by " machinery, stating that they were delineated by the combined " action of two movements analogous to the Epicycles of " Hipparchus and Ptolemy, and explained that the number of " loops or cusps belonging to each figure were dependent upon " the ratio of velocity of the two movements, while the ratio of " their radii determined whether the curve was looped or " cusped, &c., and, if looped, the size of their loops. Among " the numerous curves exhibited in the engraving were a set of " bi-cycloids, which represented approximately, the apparent " orbids of the Planets according to Cassini, such as they " would appear if viewed from the centre of the earth, or as " they would appear respectively from the Polar star, according " to the system of Ptolemy and Hipparchus."

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On 4th November, 1867, he circulated, a paper, as follows :

POLYGONAL SECTIONS OF THE CIRCLE.

THE PENTAGON AND HEPTAGON, &c.

" I have made an interesting discovery, by finding that one " of my Kinematic Curves, when intersected by a Circle, cuts " the Circle in twelve points, five of which are equidistant from " each other, and the remaining seven are also equidistant from

" each other ; thus dividing the circle into five equal arcs by
" the first set, and into seven equal arcs by the second set.
" The Curve is not new ; but I am not aware that this singular
" result has been previously known, and it did not till recently
" occur to me that such properties must naturally be inherent
" in Curves of this description.

" Other Curves of the same class will in like manner divide
" the Circle into *any* required number of equal parts, by the
" mutual intersections of the Curve and Circle. They may be
" generated in several different ways ; some of them have been
" publicly exhibited by myself and others, as the resultants of
" three or four different modifications of motion—and they can
" be very readily mapped geometrically. I traced some of
" these Curves geometrically in 1835; and delineated them by
" continuous motion in 1840.

" As a challenge to Mathematicians, I hereby offer a prize
" of Five Pounds to the first person (whether Mathematician or
" non-Mathematician), who before the end of this year shall
" discover and demonstrate analytically, geometrically, or
" mechanically, three plane Curves having the following
" properties. *Provided* the demonstration be original and new ;
" that is, not copied or derived from any publication.

" 1st. A finite Curve which cuts a Circle in *five* equidistant
" points ; and in those points only.

" 2nd. A finite Curve that cuts a circle in *seven* equidistant
" points ; and in those points only.

" 3rd. A finite Curve which cuts the same Circle in *five*
" equidistant points; and also in *seven* equidistant points ; and
" in no more than such *twelve* points.

" 4th. Each Curve must be a continuous *line* in one plane,
" crossing the Circle at the prescribed points, but not
" intersecting itself nor cusped at *all* those points; otherwise the
" first and second Curves might be common Bicircloids, though
" no Bicircloid would fulfil the conditions of the third Curve.

" I select these three Curves as representatives of their
" class ; their investigation will of course develope the general
" law above-mentioned.

" H. PERIGAL."

The "Athenæum," preceded it thus :—"Mr. HENRY
" PERIGAL, known as the most practised of our contemporaries
in the actual construction of curves by double and triple circular
motion, of which he has published a multitude of specimens,
issues the above Challenge."

On 19th December, 1867, he wrote to Professor Jas. Chas.
Maxwell, as follows :—

" Dear Sir,
    " I received your communication, dated 14th, and have to
" acknowledge that you have discovered my Curves, the sketch
" and equations you send, showing that they are identical with
" mine, I consider, therefore, that you are entitled to the Prize
" and accordingly enclose Cheque for £5 ; I ought, however, to
" mention that I previously received two other communica-
" tions—one from Revd. W. D. Bushell of Harrow School,
" dated 10th ; and the second, dated 14th, from Mr. H. M.
" Taylor, of the School of Naval Architects, South Kensington,
" each give analytical expressions for Algebraic Curves, which
" fulfil the conditions according to their own interpretation of
" them, but neither has discovered the Curves alluded to in the
" Challenge, as you have done.   Nevertheless, as Mr. Bushell,
" first enunciated the construction of Curves which fulfil the
" required conditions according to his view of the terms of the
" Challenge, I considered him the winner of the Prize, as I had
" the pleasure of informing him on the 14th ; so my Prize has
" the unusual honor of two winners—you for discovering the
" Curves in question, and he for inventing others, differing
" from them, but having the prescribed property of cutting a
" circle in polygonal sections.   I may remark that your com-
" petitors are as yet strangers to me ; but you were one of the
" six mathematicians I had thought might perhaps discover my
" curves; the one I thought most likely was my friend Mr.
" E. Sang of Edinburgh, who discovered analytically that
" these Curves could be produced by the vibrations of rect-
" angular wires, 3 years before I discovered them geometrically
" and twice as long before I actually delineated them by com-
" pound circular motion.   Did you know, previously to the

" Challenge, that these Curves had this peculiar property and
" that they are Tetra-circloids, the resultants of 4 circular
" movements ?

<div style="text-align: right">

" Yours very faithfully,

" H. Perigal."

</div>

On the 19th April, 1870, a cutting from the "Sydenham
Times" was sent to Mr. PERIGAL, which reported a Meeting
for the formation of a "Microscopic Club," at which the
Chairman in the course of his Address, stated as follows:—
" If in the discussion of scientific subjects, opinions should not
" always coincide, let us remember that, in the words of my old
" friend Mr. PERIGAL :—

> " Experiment should be our guide,
> Let, when we differ, none decide ;
> But each exert his zeal and sense,
> In search of further evidence,
> Till overwhelming facts bring out,
> The truth, so plain, that none can doubt.
> Where pride and prejudice abound
> The truth is never to be found."

**On 21st April, 1876, he deposited on loan, at the
South Kensington Museum, where they still remain,
the following articles :—**

1 Compound Geometric Chuck, in case.
1 Soldier Experiment, in case.
1 Selenescope, in case.
1 Compass Experiment.
1 Gyroscope with 2 spheres.
1 Gyroscope with 1 sphere.
1 Revolving Gyroscope.
1 Ellipsic Kinescope.
12 Kinescopes.

1 Key for Kinescopes.

1 MS. of Dis-Ellipsic Curves (by H. PERIGAL, 1835).

7 Sheets of Diagrams of Bicircloid Curves.

1 Sheet of Diagrams of Perigal's Retrogressive Parabolas.

1 Sheet of Ellipsic Spirals.

4 Diagrams of Revolution and Rotation.

On the 24th June, he attended, as requested by the authorities, in order to give explanation of his Instruments, as above.

In 1881 Mr. Perigal reprinted and circulated the following Notices from the Literary Gazette and Transactions of the Society of Arts.

EFFECTS OF COMPOUND CIRCULAR MOTION.

" At the Marquess of Northampton's *Soirée*, on Saturday,
" 21st of March, 1846, amongst the several objects of interest
" exhibited, and in some instances explained, to the numerous
" visitors, the following chiefly attracted our attention :—Mr.
" Perigal's instrument to develop a peculiar law of compound
" motion, generating retrogressive or recurrent curves ; this,
" however, for its novelty and apparent great importance, we
" have treated in a separate article under this same division of
" our sheet.

NEW LAW OF COMPOUND MOTION.

" By the instrument, mentioned in the above notice,
" Mr. Perigal developed a peculiar law of compound circular
" motion, ' generating *retrogressive* or *recurrent* curves, by which
" the moving body, when it has reached the extreme points of
" the curve, retrogrades or returns back in exactly the same
" line along which it advanced ; constantly moving forward and
" backward from one extremity to the other ; and always trac-
" ing and retracing the same line as it alternately advances and
" recedes.'

" These curves were produced by a complicated system of
" wheel-work, which Mr. Perigal stated to be capable of

" generating numberless varieties of curves dependent upon the
" ratio of the velocities of the movements ; but the instrument
" was, on this occasion, adjusted for the production of parabolas
" or hyperbolas, and a sort of figure of 8 curve resembling a
" lemniscate, which he shewed to be different forms of one and
" the same curve, just as circles and right lines are (limits or)
" varieties of ellipses. When the tracing-point passed through
" the center, the curve was at one of its extremes or limits ;
" and the two ovals of the figure of 8 were opened to their
" fullest extent of roundness ; but alterations in the angular
" adjustment of the movements caused these ovals to become
" more and more flattened, till they ultimately converged or
" collapsed, and became in appearance a single line terminating
" in points, with the form of a parabola or hyperbola ; and
" the tracing-point travelled forward and backward from one
" extremity of the curve to the other repeatedly, without in the
" least degree thickening the line in one part more than in
" another ; evidencing that it advanced and receded in exactly
" the very same path ! In fact, the line of return might be
" considered as superposed upon the line of advance ; as Mr.
" Perigal remarked, in reply to a very eminent mathematician,
" who objected that the figure of 8 curve was a line of the
" fourth order, inasmuch as it could be cut by a straight line in
" four places, while the parabola was a line of the second order,
" because it could be so cut only in two places ; but the sugges-
" tion of its being a double line superposed seems to remove the
" difficulty.

" Mr. Perigal mentioned that one of his objects was to
" exhibit the PARABOLA in the novel character of a *retrogressive*
" or recurrent curve of definite range ; whence he inferred, that
" *if a comet moved in that curve* (as most of them are said to do)
" it *might return* after it had performed its allotted journey, *and*
" *continue to visit us periodically ;* as several do, which are there-
" fore supposed to travel in very elongated ellipses, although
" their apparent path more resembles a parabola.

" We do not take upon ourselves to decide that this
" '*retrogressive*' curve of Mr. Perigal is or is not identical with
" the parabola of Apollonius ; but we can bear testimony to

" its striking resemblance to the conic section ; affording at
" least *prima-facie* evidence of its relationship, however much
" its newly discovered property of ' *periodicity* ' may shock the
" prejudices of those who have hitherto thought themselves
" learned in such matters.   Besides, it is well known that
" reciprocating straight lines can be produced by combinations
" of circular motions ; and, therefore, we cannot see why it
" should have been deemed impossible so to produce parabolas
" and hyperbolas, which, being curved lines, would even appear
" the less unlikely.   Of the importance of the discovery in
" reference to the cometary theory, our scientific readers will
" judge for themselves ; and such of them as are mathematicians
" can, for their own satisfaction, put the question to the proof
" by submitting the problem to analytical investigation.—
" *Literary Gazette*, 28*th March*, 1846."

" At the next subsequent *soirée* (4th of April), was exhibited
" another new instrument of Mr. Perigal's, for the practical
" development of

" ANOTHER NEW LAW OF COMPOUND MOTION,

" proving that the parabola occurs as a *branch, or component part*,
" of a great variety of curves.   This he showed by a modifi-
" cation of Professor Wheatstone's photometer ; the curve
" selected being a trochoidal curve of eight symmetrical loops,
" which became eight cusped branches, or eight hyperbolic,
" or eight parabolic branches, &c., varying according to the
" radial adjustment of the bright steel ball representing a
" comet or planet ; which, in this case, always moved in one
" and the same direction, instead of alternating in opposite
" directions, as in the experiment exhibited at the previous
" *soirée.* Mr. Perigal explained that, besides multitudes of
" other kinds, there are innumerable varieties of this particular
" kind of curve, having any imaginable number of symmetrical
" branches, approximating more or less nearly to the ellipse
" and parabola ; in other words, that these are curves of which
" the ellipse, the hyperbola, and parabola, are limits or
" particular cases.

" It seems to result, then, from these experiments, that
" it is not impossible for comets to *return periodically*, either

" forward and backward alternately, or always in the same
" direction, although moving in ' curves which cannot be
" distinguished from parabolas ; ' quite as possible, indeed, as
" if they moved in elongated ellipses. (The consideration of
" the forces requisite to maintain them in such orbits is of
" course a totally distinct question). That is to say there
" is nothing in the nature or properties of the curve itself
" to render the comet's periodical return impossible, now that
" the attribute of infinity, ascribed to the curve, is no longer
" admissible, except to express only the extreme or limit of
" the curve ; just as a straight line may be imagined capable
" of infinite extension, but nevertheless may be drawn of any
" requisite degree of shortness, and is still a right-line whether
" short or long.—*Lit. Gazette, 7th April,* 1846.

" Mr. Henry Perigal, literally, as well as figuratively,
" made a considerable noise among the learned with a piece
" of clockwork, which kept a small steel ball, representing a
" comet, in very rapid motion, in a curve of a very curious
" and beautiful figure—a sort of eight-rayed star, of which
" the eight branches were of a parabolic form. This, we
" understood, was intended to prove that a comet might return
" along the same path, and continue to visit us periodically
" although moving ' in a curve which cannot be distinguished
" from a parabola.' This experiment differed from one he
" exhibited at the previous *soirée,* inasmuch as the curve then
" shown had but one branch instead of eight ; and the comet
" moved alternately in opposite directions, backwards and
" forwards (always in exactly the same line), while in the
" present case the comet continued to move always in one
" and the same direction. These discoveries of Mr. Perigal
" are especially interesting and important at the present time,
" when so many as five comets have been visible at once in
" the starry firmament.—*Morning Post, 6th April,* 1846.

" ON THE REVOLUTION AND ROTATION OF THE MOON.

" At the *soirée* held at the house of the Marquess of
" Northampton, President of the Royal Society, on the 13th
" of February, 1847, Mr. H. Perigal exhibited and explained
" a variety of experiments, with a view to elucidate the theory

" of Revolution and Rotation, especially referring to the
" (hypothetical) motions that have been attributed to the
" Moon, to account for her presenting towards us always the
" same face or hemisphere. One of his instruments imparted
" to three ivory balls movements similar to those ascribed
" to the Moon in each of the three following hypotheses; and
" the resultant paths, which the component atoms of the Moon
" would in each case describe in space, were made evident to
" the eye by another little instrument which he called a
" Kinescope. With the aid of maps, on which were accurately
" laid down the positions of the Moon in accordance with the
" several hypotheses, these instruments and other auxiliary
" contrivances afforded ocular demonstration that, of the three,
" the last is the only one that will bear investigation.

" 1st hypothesis. That the Moon revolves round the
" Earth, and rotates on her own axis, in the same period, and
" in the same direction. These two circular motions would
" cause every individual atom of the Moon to move round
" the earth in a separate curve of the cardioid kind; these
" curves would vary in phase and dimensions according to
" the relative distance of each atom from the axis of rotation,
" and they would intersect in all directions.—In this case, the
" Moon, every time she travelled round the earth, would have
" two alternations of sidereal day and night, but only one
" alternation of terrestrial day and night; because, as regards
" the Stars which are outside her orbit, she would *turn round*
" twice, once round the Earth, and once round her own axis;
" but, as regards the Earth, which is inside her orbit, she
" would turn round only once; inasmuch as her orbital motion
" is a movement of migration or translation, which alters her
" *bearing*, but not her *aspect* to the Earth round which she
" revolves.—Consequently, if the Moon were, simultaneously,
" to revolve around the Earth and to rotate about an axis
" within herself, with equal angular velocities in the same
" direction, all parts of her surface must be presented succes-
" sively towards the Earth in the course of each rotation; as
" the inevitable result of such double motion. Map 1.

" 2nd. That the Moon revolves round the Earth, and

" rotates on her own axis, in the same period, but in contrary
" directions. These two circular motions would cause all the
" component atoms of the Moon to describe in space separate
" circles, all of the same size, intersecting in every direction.—
" In this case the Moon, each time she revolved round the
" Earth, would have one alternation of terrestrial day and
" night, for the same reason as before explained; but no
" alternation of sidereal day and night; because, as regards
" the Stars outside her orbit, the turns she makes in one
" direction round her own axis counteracts the other turn
" she makes round the Earth. If the two axes were coinci-
" dent, the two motions would destroy each other, and apparent
" rest would ensue; but in this instance they would neutralize
" each other so far as this particular effect of turning round;
" consequently she would maintain what is called the paral-
" lelism of her diameters, a result which, hitherto, has been
" attributed erroneously to the action of one circular motion
" (revolution) alone.—Consequently, if the Moon were, simul-
" taneously, to revolve around the Earth and to rotate about
" an axis within herself, with equal angular velocities in con-
" trary directions, all parts of her surface must be presented
" successively towards the Earth in the course of each rotation;
" as the inevitable result of such double motion.   Map 2.

" 3rd.   That the Moon revolves round the Earth, but
" does not rotate on her own axis.—This single circular motion
" would cause all the component atoms of the Moon to describe
" round the Earth concentric circles varying in size according
" to their radial distance from the centre of revolution.—In
" this case the Moon would have one sidereal day and night
" every time she revolved about the Earth ; because she would
" thereby turn round as regards the Stars ; while her *aspect*
" to the Earth being unchanged by her orbital motion, she
" would have no alternation of terrestrial day and night.—
" Consequently, if the Moon were to revolve about the Earth,
" without any additional rotation on an axis within herself,
" the same hemisphere must be presented constantly towards
" the Earth, as the inevitable result of such single motion ;
" and we should see the same face invariably, as we do now.
" Map 3.

" Thus it was rendered evident to the eye, as well as to the
" mind, that the *last* hypothesis *may be true* ; but that *neither*
" of the others would produce the effect that, hitherto, has
" been attributed to them by their respective advocates.

" Wherefore, if the Moon orbitates about the Earth as
" its Satellite, any additional rotation in the same or in the
" contrary direction around her own centre of gravity is
" physically impossible ; if it be true that she always presents
" towards us the same hemisphere, a fact which there seems
" no reason to doubt. Or, if she rotates on her own axis, she
" cannot also revolve about the Earth as her only centre of
" orbitation.—She cannot partake of *both* the circular move-
" ments in question, be they termed revolution and rotation, or
" distinguished by any other appellations ; but, if our Satellite,
" she must orbitate around the Earth without any rotation
" on her own centre of gravity or about any axis within herself.
" Consequently her *libration* is not caused, as asserted, by the
" inequality of two such movements ; and remains to be
" accounted for.—*If* the Earth were *her* Satellite, she *might*
" rotate on her axis in the same period and in the same direction
" as the Earth revolved round her.—*See Literary Gazette*, 20*th*
" *Feb.*, 1847.

" At the Marquis of Northampton's *soiree*, 13th of March,
" 1847, Mr. Perigal exhibited several of his kinescopes, pro-
" ducing spiralities and convolutes, certain curves which
" ' progress ' in spires (coils, or circumvolutions), so that any
" portion of any such curve is a portion of a spiral. Mr. Perigal
" explained that some of these curves were ' interminate,' or
" capable of unlimited extension, such as the spiral of
" Archimedes, &c. ; others finite, ' returning into themselves '
" at the termination of their respective cycles, to reiterate the
" same path in the same direction ; each forming (when com-
" pleted) a continuous line, of which all the component parts
" are spiral. Of these finite curves there are, according to
" Mr. Perigal's account, innumerable varieties, distinguished
" by the number of their spires, and of their loops ; the most
" simple being produced by the combination of two circular
" motions, of which the curves he exhibited were examples.

" Whence, Mr. Perigal asserts, the property of infinite exten-
" sion, hitherto ascribed to all spirals, is applicable to com-
" paratively a few kinds only ; a vast majority of *spirals being*
" *parts of curves, which curves (if completed) return into themselves.—*
" *Literary Gazette, 20th March,* 1847.

" At the Meeting of the Society of Arts, on 26th March,
" 1851, after the reading of Mr. Jopling's Paper on Geometric
" Curves, &c., Mr. HENRY PERIGAL, Jun., F.R.A.S., referring to
" the beautiful SPIRALS exhibited by Mr. Jopling and by Mr.
" Penrose, remarked that the *Reciprocals* of all BICIRCLOIDS (the
" *resultants* of *two circular movements*) are SPIRALS of a peculiar
" kind which *return into themselves* ; the number of their *spires*
" or *circumvolutions* being in accordance with the relative veloci-
" ties of the *epicycle* and *deferent*—the spiral character being most
" apparent when the velocity of the latter movement is much
" greater than that of the *epicyclic* movement.   This he ex-
" emplified by some of his *Kinescopes* ; instruments constructed
" after the principle of Wheatstone's *Photometer*, which imparted
" the required double motion to bright steel balls ; so that the
" orbit or path of the ball in space was made evident to the eye
" (whence the term *kinescope*) by the light reflected from it in its
" rapid career.   After exhibiting several of these ' philosophical
" toys,' he explained that all curves are compounded of two or
" more similar portions, which he called *integrants* of the curve ;
" for instance, the ellipse consists of four similar quarters ; the
" oval or egg-shape has two similar halves ; the parabola and
" hyperbola have each two symmetric branches ; the cardioid
" two similar halves ; the two-looped, three-looped, four-looped,
" &c. bicircloids have four, six, eight, &c. integrants respec-
" tively ; while the circle (alone) may be divided into any
" number of similar and equal arcs.   This circumstance had
" enabled him to classify and tabulate the bicircloids comprised
" within certain limitations as to number of *loops* and *spires*,
" whereby he derived the following results, viz. :

" Bicircloids, of which the loops or the spires

" are not more than	-	-	-	-	-	3	=	10
-	-	-	-	-	-	9	=	70
-	-	-	-	-	-	99	=	7,510
-	-	-	-	-	-	999	=	759,480
-	-	-	-	-	-	5000	=	18,998,410

" each of which is susceptible of innumerable *phases*, or
" variations of form.

" Finally, he exhibited and explained one of his Kinegraphs,
" which generates *retrogressive* or *recurrent* curves by compound
" circular motions. In this case, the tracing-point advanced
" and receded continuously in a single line *terminating in points*
" while delineating a *finite* curve, having for its equation

$$y = a \cos \phi, \ x = b \cos 2\phi;$$

" this, which gives $a^2 (b \pm x) = 2 b y^2$,
" will be recognized as *the common conical* PARABOLA within the
" *finite* limits of $y = \pm a, \ x = \pm b$!

" Mr. PERIGAL, in the course of his remarks, distributed
" among the members and visitors various specimens of *kinematic*
" curves produced by *Ibbetson's Geometric Chuck*, and by other
" instruments adopted or contrived by himself for the elucida-
" tion of KINEMATICS, the science which treats of the *effects of*
" *motion*, the *causes of motion* being the province of DYNAMICS.
" He likewise distributed geometrical diagrams of the *retrogressive*
" PARABOLA *derived from the circle*, of which the following is a
" reprint from his stereotyped plate.

" THE RETROGRESSIVE PARABOLA.

" DERIVED FROM THE CIRCLE.
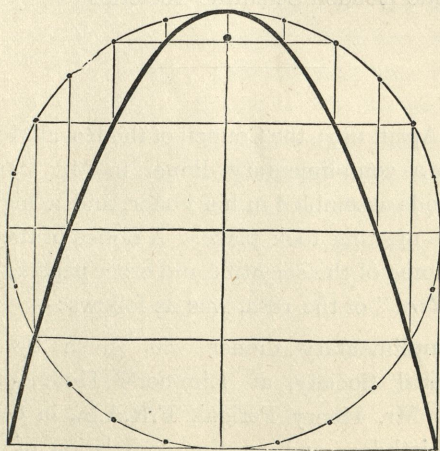
" DISCOVERED BY PERIGAL IN 1835.

" The origin of Co-ordinates at *center* of Circle, **R**adius **R**.

" $y = \mathbf{R} \cos \phi$; $x = \mathbf{R} \cos 2\phi = \mathbf{R} (2 \cos^2 \phi - 1)$;

" $\therefore 2y^2 = \mathbf{R} (\mathbf{R} + x)$.

" *y*, the distance of any point of the Parabola from its *axis*.

" The *Kinematic* Curve, of which the *Retrogressive* Parabola
" is *a limit*, was discovered by Mr. Perigal in 1835, and produced
" from *continuous motion* by him in 1840.—*See Transactions of the*
" *Society of Arts, vol.* 57. *Proceedings at Meeting of* 26*th March,*
" 1851."

In the " *Daily Graphic*," of 28th September, 1891, is a
picture of " The Inaugural Soirée of the Photographic Society's
Exhibition," in which a good representation of Mr. PERIGAL,
whose name, as well as those of Mr. J. Glaisher—the President,
and Mr. Bird—the Treasurer, are the only ones specified. The
picture referred to, was by an artist unknown to Mr. PERIGAL.

In 1893, a portrait of Mr. PERIGAL, was exhibited at the
Leeds Astronomical Society, as representing " The venerable
Patriarch of the London Scientific Societies."

On 15th April, 1893, the Council of the Royal Meteorological
Society gave a complimentary dinner to Mr. PERIGAL, when
58 of his friends assembled in his honor, and a highly sociable
and enjoyable meeting took place. A notice of the said dinner
appeared in some of the scientific and other papers ; a transcript
in the " *Standard* " of the 18th, was as follows :—

" A complimentary dinner was given by the Royal
" Meteorological Society, at Limmer's Hotel, on Saturday
" evening, to Mr. Henry Perigal, F.R.A.S., in celebration of
" his 92nd birthday, and on the completion of forty years'
" service as Treasurer.—The President, Dr. C. Theodore

" Williams, in proposing the toast of the evening, gave some
" interesting particulars of the Perigal family, tracing their
" history back to some time before the Norman Conquest.
" It appears that the family have been remarkable for longevity.
" Mr. Perigal's father, who was 99¼ years of age when he
" died, was one of thirteen children, nine of whom attained
" respectively their 64th, 67th, 77th, 80th, 88th, 90th, 94th,
" 97th, and 100th year, the last five averaging 93 years 100 days.
" Their father and mother died in 1824, the former being
" nearly 90, and the latter upwards of 80 years of age.   Mr.
" Henry Perigal was the eldest of six children, one of whom
" lived to the age of 85, and the youngest, Mr. Frederick
" Perigal, now in his 82nd year, was present at the dinner.—
" Mr. Perigal briefly responded to the toast, thanking the
" company for their congratulations and kind wishes."

In a lecture on the " *Preparation of Linear Scientific
Diagrams*," by Mr. Washington Teasdale, is the following :—
" No one had done so much as Mr. Perigal to analyse, reduce
" to their initial forms, and scientifically classify, the possibilities
" of curve-tracery inherent in the single, double, and triple
" chuck of Ibbetson.   Of the utility of his work in this
" direction, there is ample testimony.   Professor A. de Morgan
" says : ' He has published valuable diagrams in profusion ;
" ' also that he is entirely indebted to him for the illustrations
" ' of the article on Trochoidal curves, published in the Penny
" ' Cyclopædia, without which the article would not have been
" ' written.'   The late Mr. Richard A. Proctor's work on the
" Geometry of Cycloids in relation to Planetary Movements,
" is chiefly illustrated by diagrams from blocks cut in the
" lathe by Mr. Perigal.   Northcote, in his book, on the Lathe,
" gives an illustration of the actual apparatus used, and quotes
" the direction and authority for its intelligent use, the 39 rules
" which Mr. Perigal wrote for the guidance of those desirous
" of working with Ibbetson's Chucks."

From the " *Camera Club Journal*," May, 1894.

In the publication "Mothers and Daughters," July, 1894.

HIDDEN BEAUTIES OF NATURE.

By Richard Kerr, F.G.S.

DIATOMS.—*Continued.*

" At the recent conversazione of the Royal Society, Mr.
" Joseph Gould exhibited a twin-pendulum of the most simple
" construction, which delineated an endless variety of beauti-
" fully curved figures, the result of a certain law inseparably
" connected with music. So splendidly did the pendulum
" trace out the attractive designs, that we found it a difficult
" matter to get away to study the many other exhibits. Looking
" on with admiring appreciation was Mr. Perigal, now in his
" ninety-fourth year, the most skilful bow-compass penman of
" this or any other age ; a gentleman whose marvellous power
" of complex curve-making astonishes every one who has seen
" his work. So closely does Mr. Perigal's handiwork resemble
" the tracery done by the harmonic pendulum, that one is
" frequently mistaken for the other. The results in each case
" are enclosed within an area of a few inches.

" In addition to patterns thus produced there are the
" charming designs accomplished by the lathe and by other
" mechanical contrivances. While we express great admiration
" for the splendid works to which we have referred, and of
" which we have specimens we value exceedingly, we are bound
" to say that Nature ' puts them all in the shade.'

" A simple diatom from Thames mud so much outdistances
" the pendulum, the bow-compass, the lathe, and other mechan-
" ical contrivances, that we unhesitatingly give to it the greater
" homage. A small sample of guano, imported from South
" America, and no larger than a marble, will contain thousands
" of diatoms, any one of which will baffle the powers of a genius
" to imitate."

In the publication called " *St. Paul's*," of 22nd December, 1894, are some photos. by Mr. H. S. Mendelssohn, one being an excellent one of Mr. H. Perigal, and in an article relating to the artist and his works, signed by 'Anna de Bremont, is the following extract:—" The school to which Mr. Mendelssohn " belongs, is the Rembrandt . . . . . perhaps no better " example of the perfection to which he has carried this " Rembrandt style, could be found than in his portrait of " Mr. H. Perigal, one of the 75 Members of the South Kensing- " ton Museum, a gentleman more than fourscore years of age. " When he sat for his photo. ; no one looking on this admirable " portrait will deny, that old age has its beauty equal to that of " maidenhood, as seen in the excellent portrait of Miss Wilson. " ' Speaking of old age,' observes Mr. Mendelssohn, when this " fine work is duly discussed, ' all seasons of life have their " ' peculiar beauty, here are portraits of the little Lord Alister " ' Gower, and the little Marquis of Stafford, which are not " ' more beautiful in their truth to the loveliness of infancy, " ' than the beauty of old age as seen in Mr. Perigal's " ' portrait.' "

When notice of his death was inserted in the "Times,"
it was added that his body would be cremated at a specified
time; consequently the President, Secretary, Asst. Secretary,
and four other Members of the Royal Meteorological Society,
as likewise the Hon. Secretary, and four other Members of
the Camera Club, attended, in addition to an Office Colleague,
and such of the Perigal family as were able to attend; the
burial service was read by his cousin, the Rev. Nicholas Brady,
M.A.

ROYAL METEOROLOGICAL SOCIETY,
22, GREAT GEORGE STREET, S.W.

Resolution adopted at the meeting, June 15th, 1898.

" The Council and Fellows of the Royal Meteorological
" Society, have heard with deep regret of the death of their
" esteemed Treasurer, Mr. Henry Perigal, F.R.A.S. He joined
" the Society on June 4th, 1850, was elected on the Council on
" Dec. 22nd, 1851, and was appointed Treasurer on May 24th,
" 1853, which office he held continuously until his death on
" June 6th, 1898, a period of 45 years.

" The Council and Fellows desire to record their high
" sense of the valuable service which Mr. Perigal rendered to
" the Society for so many years, and of the keen interest which
" he took in the discharge of his duties.

" The Council and Fellows desire to express their sincere
" sympathy with his brother, Mr. Frederick Perigal, and other
" members of the family in their bereavement."

ROYAL METEOROLOGICAL SOCIETY,
22, GREAT GEORGE STREET, S.W.,
June 15th, 1898.

FREDERICK PERIGAL, Esq.

" Dear Mr. PERIGAL,

" As senior Secretary of the Royal Meteorological Society,
" I have the mournful satisfaction of enclosing copy of a
" Resolution which has just been passed unanimously, both
" the Council, and by the Fellows in General Meeting.

" I need hardly add, that ever since, in 1857, I paid my
" first subscription, and so made your good brother's personal
" acquaintance, I have rejoiced in his friendship, and appreciated
" his services to the Society.

<div align="center">" With sincere sympathy,</div>

<div align="right">" Yours very truly,</div>

<div align="center">(Signed) " G. J. SYMONS,</div>

<div align="right">" Secretary."</div>

Notice in " The Journal of the Camera Club." July, 1898.

IN MEMORIAM.

" The Club has lost, by the death of the late Mr. HENRY
" PERIGAL, one of its most constant visitors and cordial sup-
" porters.   He passed away without pain on the 6th of June,
" and was cremated at Woking, on the 9th, in the presence of
" numerous friends, including the Hon. Secretary and several
" representatives of the Camera Club.   The late Mr. Perigal
" entered the Club when it annexed the members of the Amateur
" Mechanical Society, and those who have seen the delicate
" mechanical work which Mr. Perigal executed when in his
" prime, must acknowledge that few amateurs ever rose to the
" pitch of excellence attained by him in the high and refined
" style of ornamental turning and curve drawing, especially
" those engravings of curves born of the geometric chuck, con-
" trived by Ibbetson in the earlier years of the century.   We
" reproduce one specimen,† culled from many hundreds left by
" the deceased, and it will be seen to consist simply of groups
" of circles cut in the lathe.   We are also enabled, by the
" kindness of Mr. A. Stroh, to give a portrait* of Mr. Perigal,
" taken by Mr. Stroh a few years since, and which will recall
" the well-known features of our lost friend to every frequenter
" of the lectures at the Club.

---

† See Addenda for other specimens.

* The photo by Mr. Stroh is on a portion of this impression, and one
  by Mr. Mendelssohn on the remainder.   See frontispiece.

"Mr. Perigal was born on April 1st, 1801, so that he was "over 97 years of age at his death, and he retained his faculties "to the end, and would converse clearly with his friends up to "the day before his death. He came of an old Norman family, "originally named Segui; but in the year 911 changed to "Perigal,* by Rollo, Duke of Normandy, as a mark of distinction "for bravery in action—'Peri-gal,' or Perish the Gauls, having "been the pass-word on the occasion mentioned. One branch "of the family, which settled at Dieppe, became Protestants, "and suffered many years of systematic persecution, a detailed "account of which exists among the historic documents of the "family, which, on the Revocation of the Edict of Nantes, had "to escape to England in 1688.

"His family has been remarkable for longevity, no less "than six of his uncles having attained an average age of 93 "years.

"Mr. Perigal was the author of a great many pamphlets "on geometric matters, the list comprising twenty items, "beginning with 'Experimental Researches in Kinematics,' "and ending with 'Tracts on the Moon Controversy.'

"Two years since his friends presented to him an album "with the portraits of fifty of his admirers, and which, containing "as it does some of the most eminent names in science, will "form a valuable heirloom in the family.

"His portrait has appeared in several of the Club exhi-"bitions, those by Mr. Evans, Mr. Stroh, and Mr. Craigie being "among the best. A pupil of Herkomer, Mr. P. M. Teasdale, "painted an admirable life-sized portrait of him in oils, which "will be much valued by his friends.

"The deceased was a member of 17 learned and other "Societies, including the Camera Club, and he was a constant "attendant at the Friday evening lectures at the Royal "Institution.

"He was cheerful in disposition, enjoyed a joke, and spent "much time in contriving pieces of apparatus to simplify "geometric teaching. Believing that he had succeeded in

* See page 55.

" accomplishing an amount of good during his life-time, and
" that he had, in his investigations of compound circular motion
" discovered laws previously unknown, which might be applic-
" able to the movements of the planetary and heavenly bodies,
" he was desirous of having his models and writings preserved
" for future use, and his name associated therewith, he having
" spent a large amount of time and money in his researches;
" he therefore in his will provided for the disposal of his
" apparatus and models so as to make them available for the
" instruction of the public.

" The good old man is gone, leaving many friends and no
" enemy. His uniform courtesy, kindness, and consideration
" for others, especially the young, will long be remembered, and
" it is hoped that his portrait now given to our readers will be
" of value in recording his venerable and kindly face—R. I."

" Journal of the Royal Microscopical Society," August, 1898.

" At the meeting held on 15th June, 1898, the President,
" E. M. Nelson, Esq., said—that since their last meeting the
" Society had lost one of its oldest Fellows—Mr. Henry Perigal,
" who had died at the advanced age of 98, and certainly had
" attended their meetings when he was at least 93 or 94. He
" did not know Mr. Perigal personally very well, but whilst
" looking up some articles in an old Society of Arts Journal,
" he came across an interesting paper, on the way in which the
" great monoliths at Stonehenge could have been moved and
" erected without the use of other than savage appliances;
" and on looking for the name of the author, he found it was
" Henry Perigal, he found in the same journal, that a prize had
" been awarded to Master J. E. Millais for a sepia drawing,
" so that at the time when Mr. Perigal was writing papers like
" that, the late President of the Royal Academy was a boy;
" yet Mr. Perigal had survived him; this forcibly brings to

" one's mind what 98 means.   Mr. Perigal did a great deal
" of work with the lathe, especially with elliptic and eccentric
" chucks.   A microphotograph of him, and also an ordinary
" photograph, were on the table that evening.

   " Mr. J. J. Vezey said, he should like to be permitted to
" supplement the remarks made by the President, respecting
" Mr. Perigal.   He thought it would interest the Fellows, to
" be reminded that Mr. Perigal joined the Society in 1852 ;
" and though microscopy had not been so great a hobby with
" him as astronomy and geometry, yet he always took the
" keenest interest in the proceedings of the Society, as indeed
" he did in all the numerous scientific societies to which he
" belonged.   Mr. Vezey had had the pleasure of paying Mr.
" Perigal a weekly visit for many years past, and he could
" testify to the eagerness with which he wished to be informed
" of all that was going on in the scientific world, especially
" since the time when he had been obliged to relinquish his
" attendance at the meetings.   Mr. Vezey felt sure the Fellows
" would greatly regret the removal of a notable name from
" their roll of membership.   Mr. Perigal died on the 6th June,
" and Mr. Vezey had seen him so lately as the 3rd June."

In the Obituary Notices of the Royal Astronomical Society, February, 1899.

   " HENRY PERIGAL was born 1801, April 1   He was the
" eldest of six children, the youngest of whom, Mr. Frederick
" Perigal, is now in his 87th year.   He came of a long-lived
" family, his father, who reached the age of 99 years, being one
" of thirteen children, nine of whom attained a great age.   He
" traced his ancestry back to Segui the Dane, who in 908
" made a successful raid on Normandy, assumed the name of
" Perigal, and settled in France.   The English branch of the
" family sprang from Gideon Perigal and his wife, Madeline
" Duval of Dieppe, Huguenots who escaped to London.   Henry
" Perigal belongs to the tenth generation of their descendants.
" He was remarkably vigorous until the last few years, and it
" may be recorded that on the occasion of the 90th birthday of

" Sir G. B. Airy (1891 July 27)—which was celebrated on
" Saturday, July 25th, by a reception at the White House,
" Greenwich Park—Mr. Perigal walked up the steep Groom's
" Hill to the reception without apparently the least distress,
" being himself a year older than the distinguished nonagenarian.
" During the last year or two, however, his strength had failed,
" and he died peacefully on 1898 June 6.

   " In early life he joined Mr. Tudor, a family connection, in
" his stockbroking business. With the greatest regularity he
" spent, for many years, his days in the office in Threadneedle
" Street, and his evenings at some scientific meeting, and his
" venerable figure was familiar at many scientific societies. He
" was treasurer of the Royal Meteorological Society for nearly
" fifty years, the fortieth anniversary being celebrated by a
" dinner given in his honour 1893 April 15. He was also a
" member of the Mathematical Society, the Microscopical
" Society, and the Royal Institution. Concerning this last it is
" interesting to note that, although he attended the Friday
" evening lectures with great regularity, it was only as a visitor
" until 1895, when he celebrated his *ninety-fourth birthday* by
" becoming a member of the Institution. One might search in
" vain the records of any other society for mention of a
" candidate in his tenth decade.

   " He was elected a Fellow of this Society on 1850
" February 8, but our publications contain nothing from his
" pen. His astronomical opinions were indeed conspicuous for
" their heterodoxy, and it is a remarkable tribute to his personal
" character that, in spite of such opinions, he was the friend of
" men whose official positions led them to regard paradoxers
" generally with special disfavour. De Morgan has recorded in
" his *Budget of Paradoxes* what trouble these eccentric opinions
" have cost him ; but he was indebted to Mr. Perigal for
" friendly help in making diagrams. In the records at the
" Royal Observatory there are bundles of letters from circle
" squarers and others, which show how little reason the late
" Astronomer Royal can have had to regard the writers with
" affection (though he always answered them courteously), yet
" he was no less glad to see Mr. Perigal at his ninetieth birth-

" day celebration than was the latter to come. And it was
" always a pleasure to see Mr. Perigal at the dinners of the
" Royal Astronomical Society Club—an inner circle of the
" Society not usually mentioned in this official report; perhaps
" an exception may be pardoned for the purpose of recording
" the fact that he was elected on 1853 June 17, fifteen years
" before Mr. Dunkin, who was the next oldest member; his
" proposer being De Morgan. Such facts as these are sufficient
" to show the remarkable way in which the charm of Mr.
" Perigal's personality won him a place which might have
" seemed impossible of attainment for a man of his views; for
" there is no masking the fact that he was a paradoxer pure and
" simple, his main conviction being that the Moon did not
" rotate, and his main astronomical aim in life being to convince
" others, and especially young men not hardened in the opposite
" belief of their grave error. To this end he made diagrams,
" constructed models, and wrote poems; bearing with heroic
" cheerfulness the continual disappointment of finding none of
" them of any avail. He has, however, done excellent work
" apart from this unfortunate misunderstanding. He was an
" excellent lathe-worker; he has written on the geometry of
" lathe-work, on the laws of motion, on the methods by which
" the Pyramids were built, on harmonic motion, cycloidal
" curves, &c. He never married, but leaves a large number of
" nephews and nieces."

The same " Obituary " appeared in the Quarterly Journal
of the Royal Meteorological Society, July, 1899, accompanied by
an excellent photo by Mr. A. Stroh.

In the publication entitled "The Photogram," July, 1898, was a photograph of Mr. Perigal, taken by the Sciopticon Co., when he was in his 97th year, accompanied with the following notice:—

"The death of HENRY PERIGAL removes a very well-known figure from photographic circles, and a man who had an almost unique personal acquaintance with all the principal scientific advances of the century. Mr. Perigal, although in his 98th year, was active, and maintained his interest in every scientific matter until very shortly before his death. He was a well-known member of the Camera Club, where he attended fairly frequently, and where he was looked upon as a mine of information. His long and active life he attributed largely to the regularity of his employment, for up to quite recently his hobby and principal work as a bow-pen draughtsman, kept him busy from eight in the morning until late in the afternoon. Although a man of independent means, Mr. Perigal was a great believer in regular work, and his friends always found it difficult to induce him to leave his employment for half-a-day. As an astronomer and mathematician, Mr. Perigal held a high position, and some of his astronomical publications, though by no means orthodox, were extremely interesting and suggestive. His principal publication took place about the time of the Great Exhibition of 1851. Mr. Perigal passed away painlessly on Tuesday, June 6th, and his body was cremated at Woking on the following Friday."

Inscription on the Monumental Stone, in the Churchyard of Wennington, in Essex.

ON THE EAST FRONT.

SACRED
TO THE MEMORY OF
HENRY PERIGAL,
(CYCLOPS),
F.R.A.S., F.R.M.S., M.R.I.,
40 YEARS TREASURER OF ROYAL METEOROLOGICAL SOCIETY, &c.
BORN 1st APRIL, 1801,
DIED 6th JUNE, 1898.
CREMATED AT WOKING.
His ashes lie beneath.
Descended from a Huguenot family,
Who escaped from France to England,
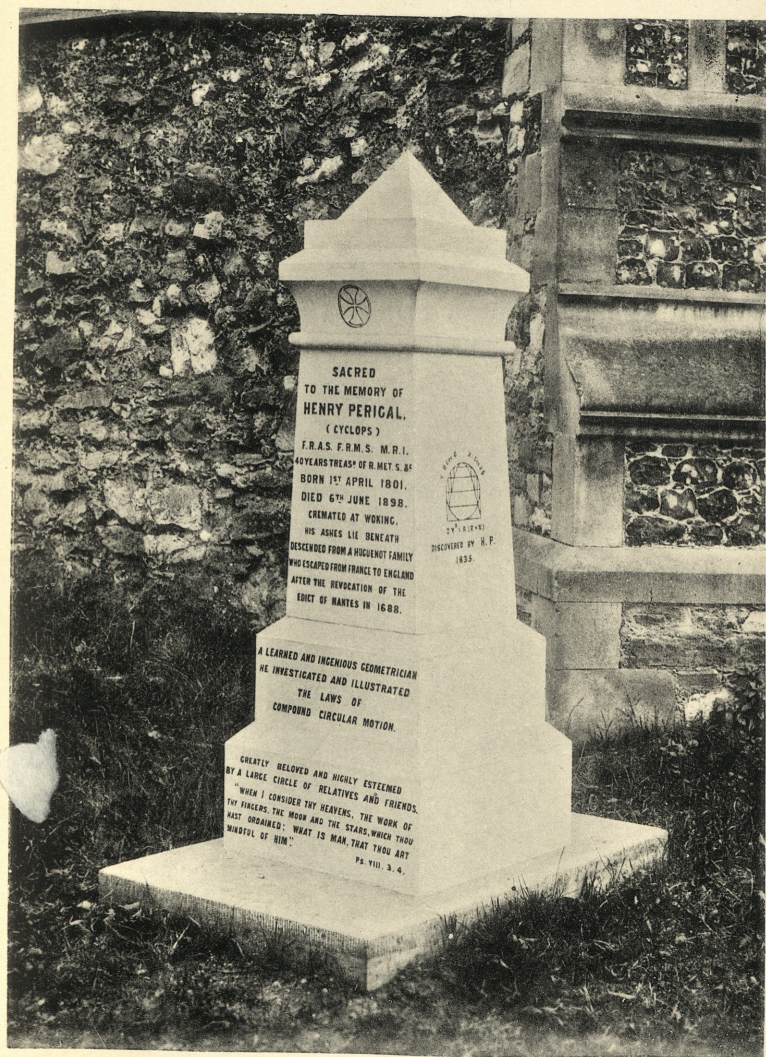After the Revocation of the
Edict of Nantes, 1688.

UPPER PLINTH.

A learned and ingenious Geometrician.
He investigated and illustrated
The laws of
Compound Circular Motion.

LOWER PLINTH.

Greatly beloved and highly esteemed
By a large circle of relatives and friends.

" When I consider Thy heavens the work of
Thy fingers, the Moon and the Stars which Thou
Hast ordained, what is man that Thou art
Mindful of him ? "

Ps. VIII., 3. 4.

SACRED
TO THE MEMORY OF
HENRY PERIGAL,
(CYCLOPS)
F.R.A.S. F.R.M.S. M.R.I.
40 YEARS TREAS^R OF R.MET.S. &^C
BORN 1ST APRIL 1801.
DIED 6TH JUNE 1898.
CREMATED AT WOKING.
HIS ASHES LIE BENEATH
DESCENDED FROM A HUGUENOT FAMILY
WHO ESCAPED FROM FRANCE TO ENGLAND
AFTER THE REVOCATION OF THE
EDICT OF NANTES IN 1688.

DISCOVERED BY H. P.
1835.

A LEARNED AND INGENIOUS GEOMETRICIAN
HE INVESTIGATED AND ILLUSTRATED
THE LAWS OF
COMPOUND CIRCULAR MOTION.

GREATLY BELOVED AND HIGHLY ESTEEMED
BY A LARGE CIRCLE OF RELATIVES AND FRIENDS.
"WHEN I CONSIDER THY HEAVENS, THE WORK OF
THY FINGERS; THE MOON AND THE STARS, WHICH THOU
HAST ORDAINED: WHAT IS MAN, THAT THOU ART
MINDFUL OF HIM".

PS. VIII. 3. 4.
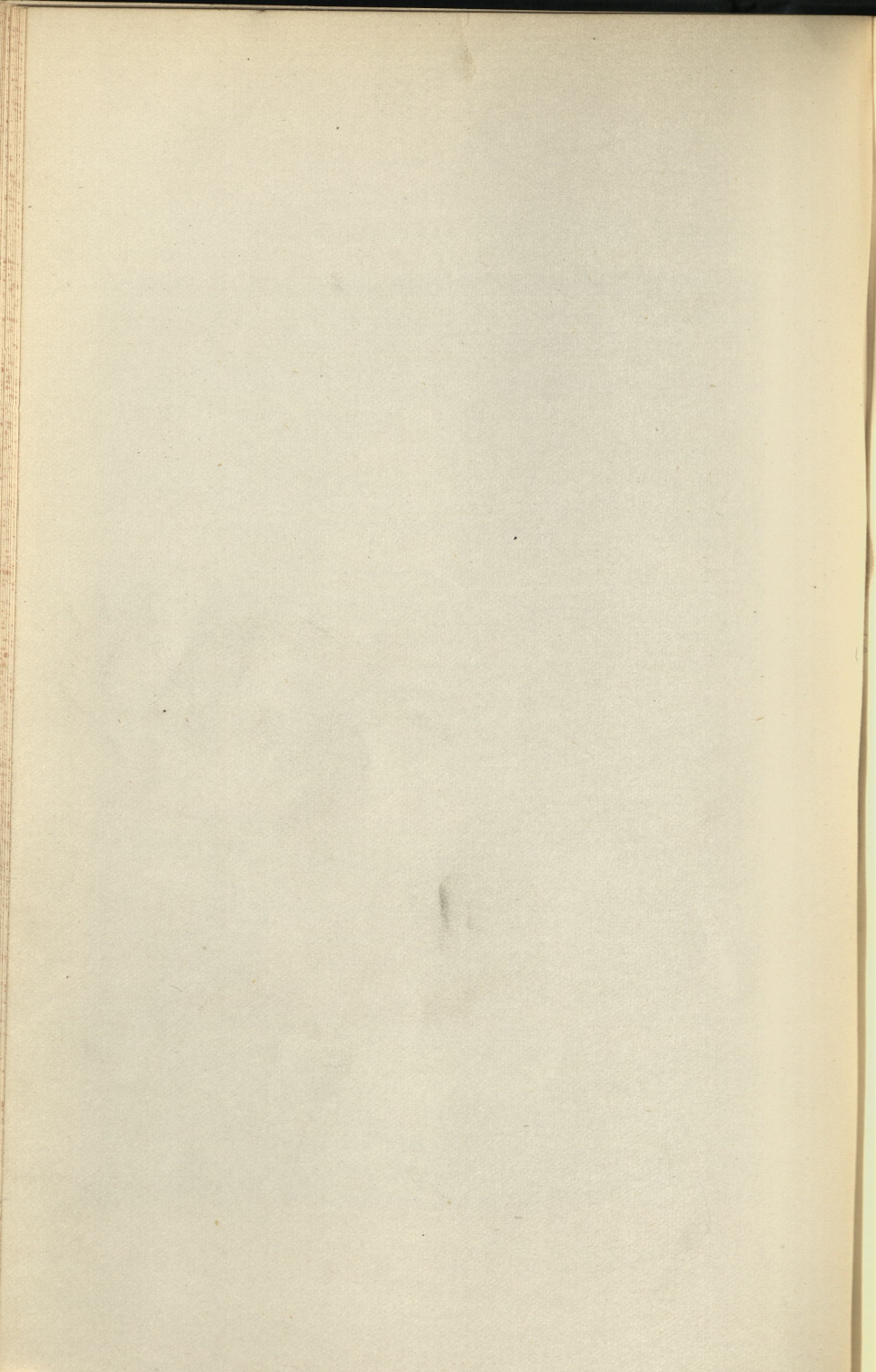
On the South Front.
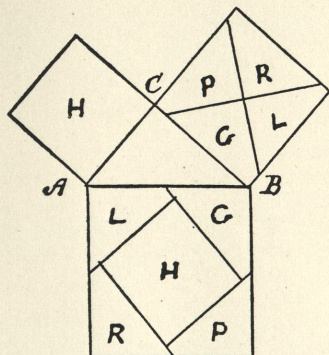
$$AB^2 = AC^2 + CB^2$$

Discovered by H. P.
1830.

———

On the West Front.

One of those unwelcome
Preachers who thanklessly
reteach their Teachers.

———

On the North Front.
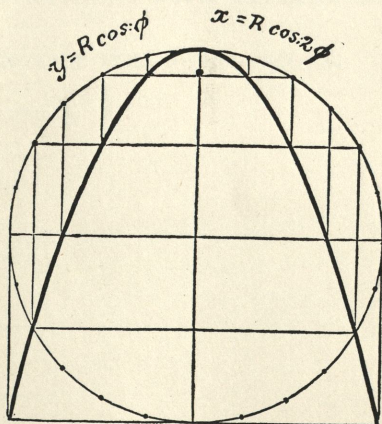
$$= R\left(2\cos^2\phi\right) - 1 \therefore 2y^2 = R\left(R + x\right)$$

Discovered by H. P.
1835.
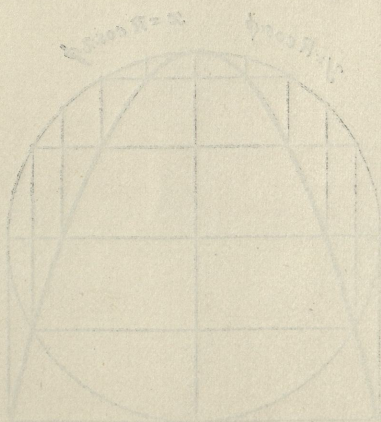
ADDENDA.

———

SOME ADDITIONAL STATEMENTS, TOGETHER WITH
A FEW ILLUSTRATIONS, WITH EXPLANATIONS THEREOF,
ARE GIVEN IN THE FOLLOWING PAGES.

In early life, Mr. PERIGAL, had a narrow escape of having been drowned, under the following circumstances :—I, at that time a mere boy, was skating with him in the Serpentine river, when he started to go round the lake, and told me to follow him, which I did for a considerable distance, until he suddenly broke through the ice, and I had only time to turn round so as to avoid falling in likewise; he was up to his arms in the water, and twice, when he had nearly crawled out, one of his skates caught the edge of the ice and he fell back again ; on the third attempt to get out he fortunately succeeded; we then skated for a short time while the wet was running off his clothes, and then walked home, eating on our way some preserved ginger which we had taken with us to keep us warm.

When a young man, Mr. PERIGAL had a large circle of friends and acquaintances, and was frequently a welcome guest at evening parties; on one occasion, when invited to a Ball in Gower Street, the coachman, who was driving him to his destination, set him down at the wrong house, the rooms of which were well lighted, and where music and dancing were going on; he entered one of the lower rooms where he had some coffee and other refreshment, then ascended to the drawing room which was rather crowded, but where he recognised people with whom he was well acquainted, so soon joined in a quadrille then about to commence, at the end of which he observed to his partner that he had not seen the Lady of the House in the rooms, she replied that the said Lady was not far off, and led him to the presence of an entire stranger ! he expressed surprise, and stated that he must have made some strange mistake, as he had believed he was at the house of another lady who he named, upon which his hostess informed him, that the lady he referred to lived a few doors off, adding, that as he had friends in her rooms, and seemed to be enjoying himself, she would be pleased if he remained where he was

for the rest of the evening; he thanked her for her hospitality, and agreed to return there after visiting the house he had been invited to; and it resulted in his spending many hours alternately at the one and the other of the two houses.

Mr. PERIGAL wrote a neat and legible hand all his life, and had a large correspondence during most of his career, not only on scientific subjects, but also of a private character. His society was in great request, he having been a freely welcome guest, and a great favorite in the numerous families he was accustomed to visit—the following few extracts from some of the letters he received, will illustrate the feelings entertained towards him by those who knew him best—in fact, it may be said of him, that the charm of his personality endeared him to his friends.

One of his scientific associates wrote in 1850: "You owe " me a deep debt of obligation for having exhibited your Curve " machine to an admiring circle of ' noble and distinguished " visitors.' It was quite by accident that I took it up to show " some ladies, and I found myself lecturing to a crowd, and " had 100 questions asked, which almost were beyond my " abilities to reply to."

Another scientist writing to a friend, with reference to the patterns traced from the Alhambra, in the " Moorish Antiquities of Spain, by Murphy;" adds: " It has been sug- " gested that they *must* have been designed by some sort of " mechanical process, curious and beautiful they are in the " extreme. If any living person could find the clue to them, " it is probably Mr. PERIGAL."

Another scientific acquaintance in 1883, writes: "Dear
" Mr. PERIGAL—cannot you manage to look in ? I want you—
" of all others—to welcome me in my new home."

A friend who he had assisted in being elected a member
of a learned society, writes: "Many thanks for your good
" news.   The household has been in a flutter for 24 hours,
" caused by the arrival of 'duplicate intimations' at small
" intervals !   The official notice came this morning.   I should
" be much obliged if you would send me your printed list of
" Fellows just to look at, as I am rather confused by the
" complicated statistics they require you to give about yourself,
" and am not quite certain whether I ought to put down my
" height, fighting weight, and favorite liquor."

One of his lady friends, writes:
" Dear Mr. PERIGAL.—Will you give us the pleasure of your
" company at breakfast, on Saturday, as that is the day fixed
" for Sophy's marriage.   You were present at my wedding,
" 27 years since, and we hope you will come to our daughter's."

Another writes:
" Can you give me help with regard to the following question ?
" What is the most probable theory as to the nature of falling
" stars, and when was the most imposing display on record ?
" I belong to a ladies question club, and my answer must be
" sent off on Tuesday."

A lady he had known from babyhood, in writing to thank
him for a brooch he presented to her, on her departure for
New Zealand—addresses him thus:
" My dear, good, kind old friend."

Another lady ends an invite to him thus :

" With kind regards in which we all join.

" Yours very sincerely.

" P.S.—The children protest against 'kind regards,' it is to

" be ' love, and nothing but love.' "

Another lady writes a long letter of thanks for pecuniary aid, stating : " I can't tell you how grateful I feel to you for " such kindness to me, and those near and dear to me—such " kindness is very rare, and you are one of the rare unselfish " beings whose chief pleasure in life is doing good to others ; " I say this—as you know –from my *heart* and not for the " sake of flattery. What I should do without such a friend " to fly to for advice and help, I don't know, but you have " comforted and cheered my path thro' many years of my life, " and brought sunshine into it."

There are numerous other letters of thanks from museums, learned societies and institutions for instruments, prints and curios presented to them by him, as also from individuals asking for some help or advice, or thanking him for past assistance, both pecuniary and otherwise ; some of them requesting immediate replies, and others involving much time and labour.

He frequently made presents to friends leaving England, and liked to ascertain what article would be most welcome.

The facetious brother of a lady going to India as a Doctor, writes : " I have asked Fanny what are her present desiderata. " The following list will afford you abundant choice—A hand " bag, musical box, small American clock, a filter (that will " work), &c. Fanny has further suggested a palanquin, a " howdah, verandah shades, a snake-killer, a turban, and a " good thick wedding ring (to last till she is married)."

The result seems to have been, as subsequently stated by the lady herself, thus : " Mr. PERIGAL always gives sensible " presents, this little clock has been my comfort and companion " ever since I arrived in India."

A lady friend begins a letter thus—on his birthday : " April 1, 1892. To-day reminds me again of you, and I " send you good wishes from us all, the *girls* say *kisses from* " them ! ! "
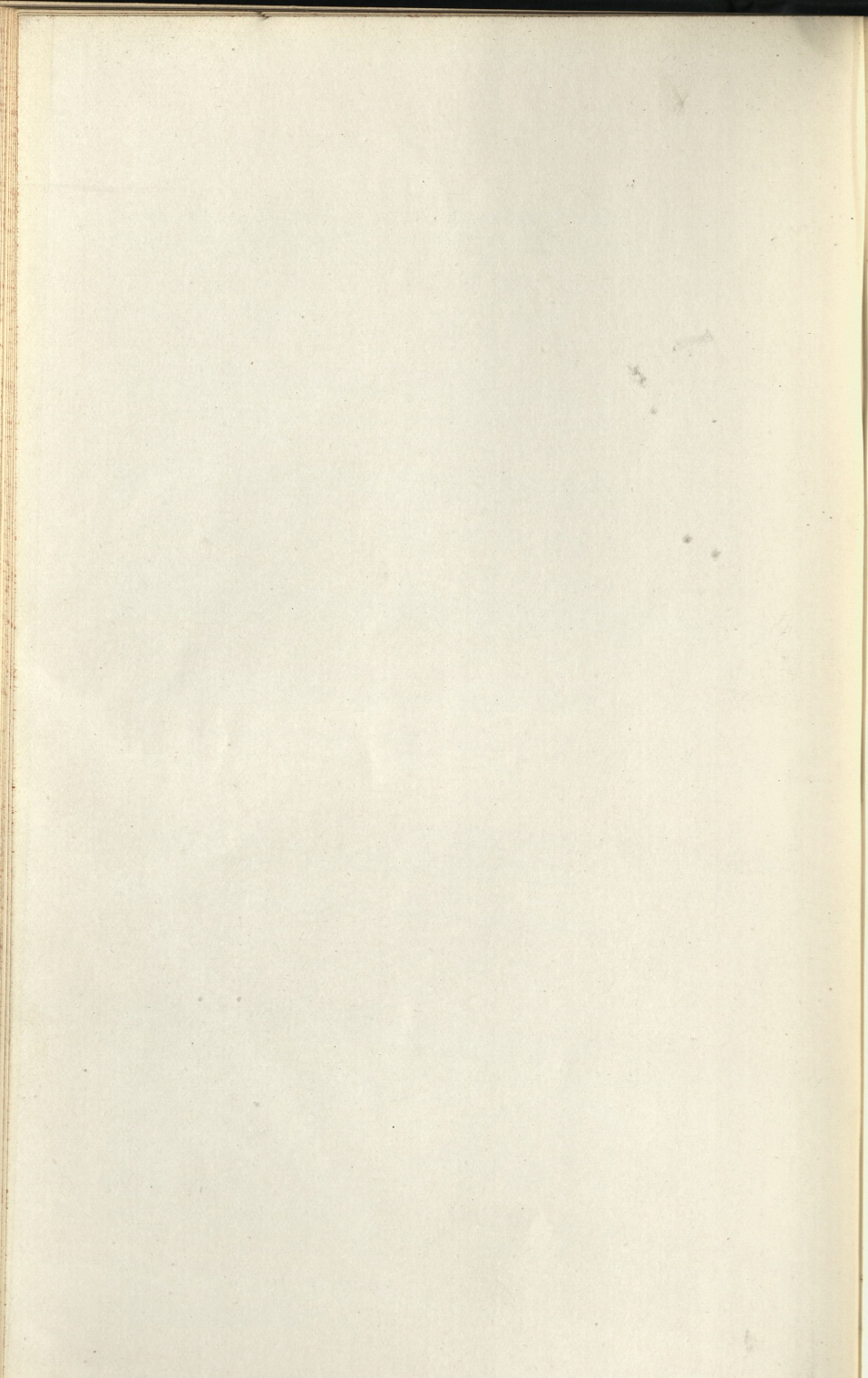
PERI-GAL
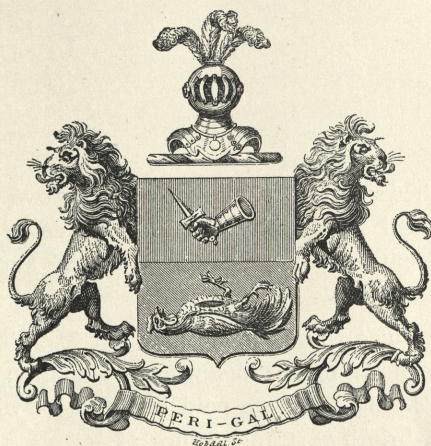
In a Norman chart existing in Paris in 1789, was an account of The Duke of Normandy granting a license, signed by his hand, and sealed with his seal, authorising one whose ancestral name was Segui—and whom he acknowledged as a good, brave, and loyal knight—to emblazon his shield, dividing it into equal parts; the upper gules charged with an azure gauntlet lined with gules and bordered with gold; and the lower sinople charged with a cock disemboweled lying on his back; for crest, a full-faced helmet with five bars of gold, and a golden collar and medal lined with gules and bordered with gold; and for supporters two lions, natural, fierce, and langued, tipped with gold, standing on a scroll, having for device the name of Perigal.

The chart contained a coloured drawing of the said arms, and recorded that " from that time the said Segui went by the name of Perigal. (See pages 5 and 40.)

On the other side is a photograph of the two rooms Mr. PERIGAL occupied for many years, and are described in the accompanying extract from a letter of a well known author to a friend, 1891 :

" I expect since the death of dear old Mr. PERIGAL, you
" have not been so much this way. I shall never forget
" the memorable day when we paid him a visit—what a scene
" it was, that labrinth of strange relics of science, the marvels
" of bow-pen lacework, the instruments covered up to keep
" the dust off, the Philosopher's simple couch in the corner
" all in view of these quaint things, and the Philosopher
" himself indefatigably squaring the circle or trisecting an
" angle, or proving that the world is all wrong about the
" moon. I don't know what it was that he was at then, but
" it was all like a leaf out of a book, wonderful and almost
" incredible. And the birthday album laid there with the
" autographs of all the high priests of science. What has
" become of it I wonder, and of the bow-pen work, and all
" the odd things strewn about in such profusion ? I must
" write an account of it some day. It was exquisite."
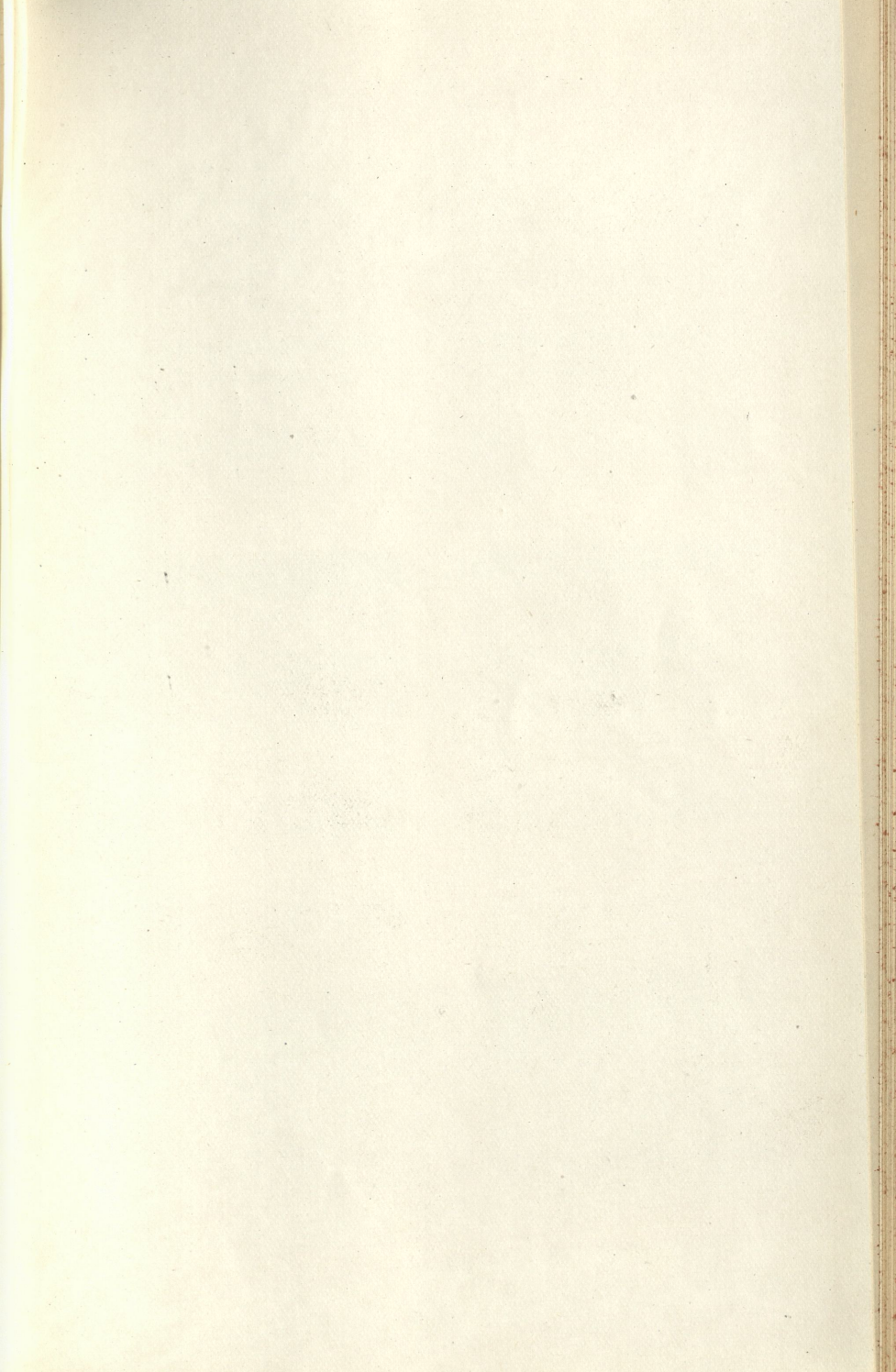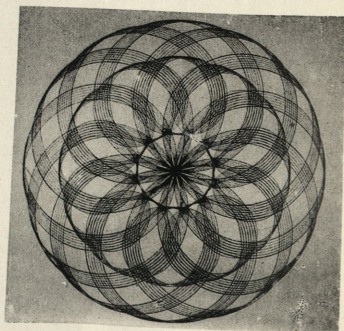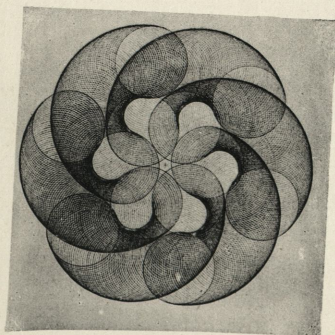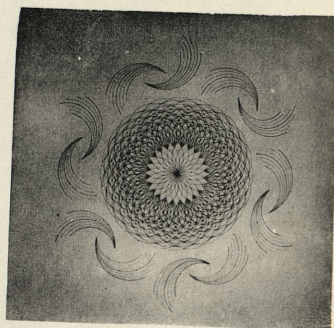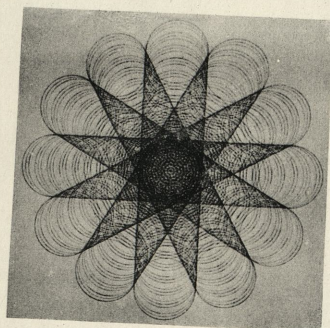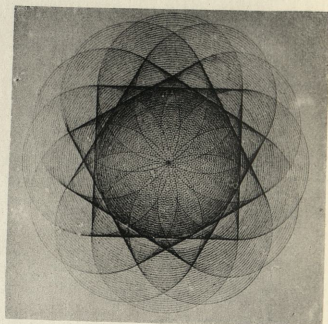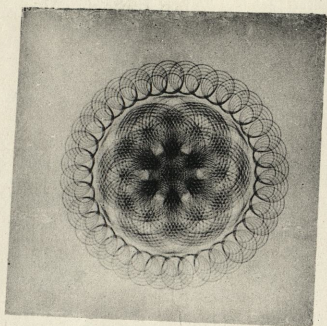
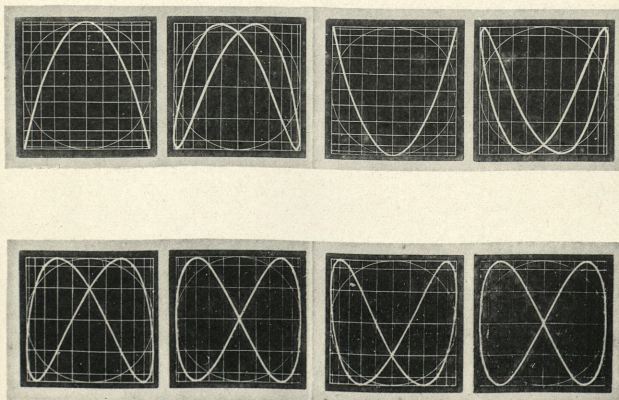The six collotype prints on the opposite page are copies of some of the bow-pen drawings of Mr. PERIGAL, on a greatly reduced scale.
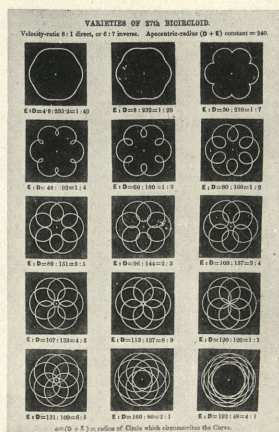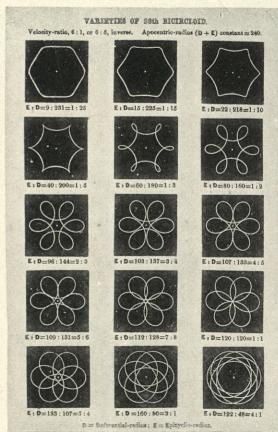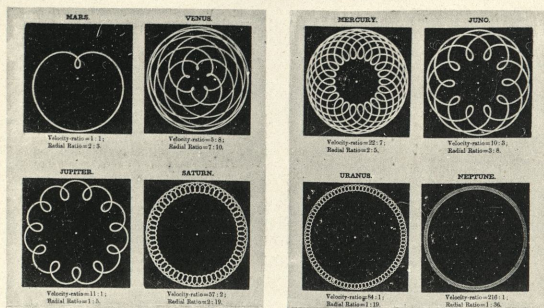
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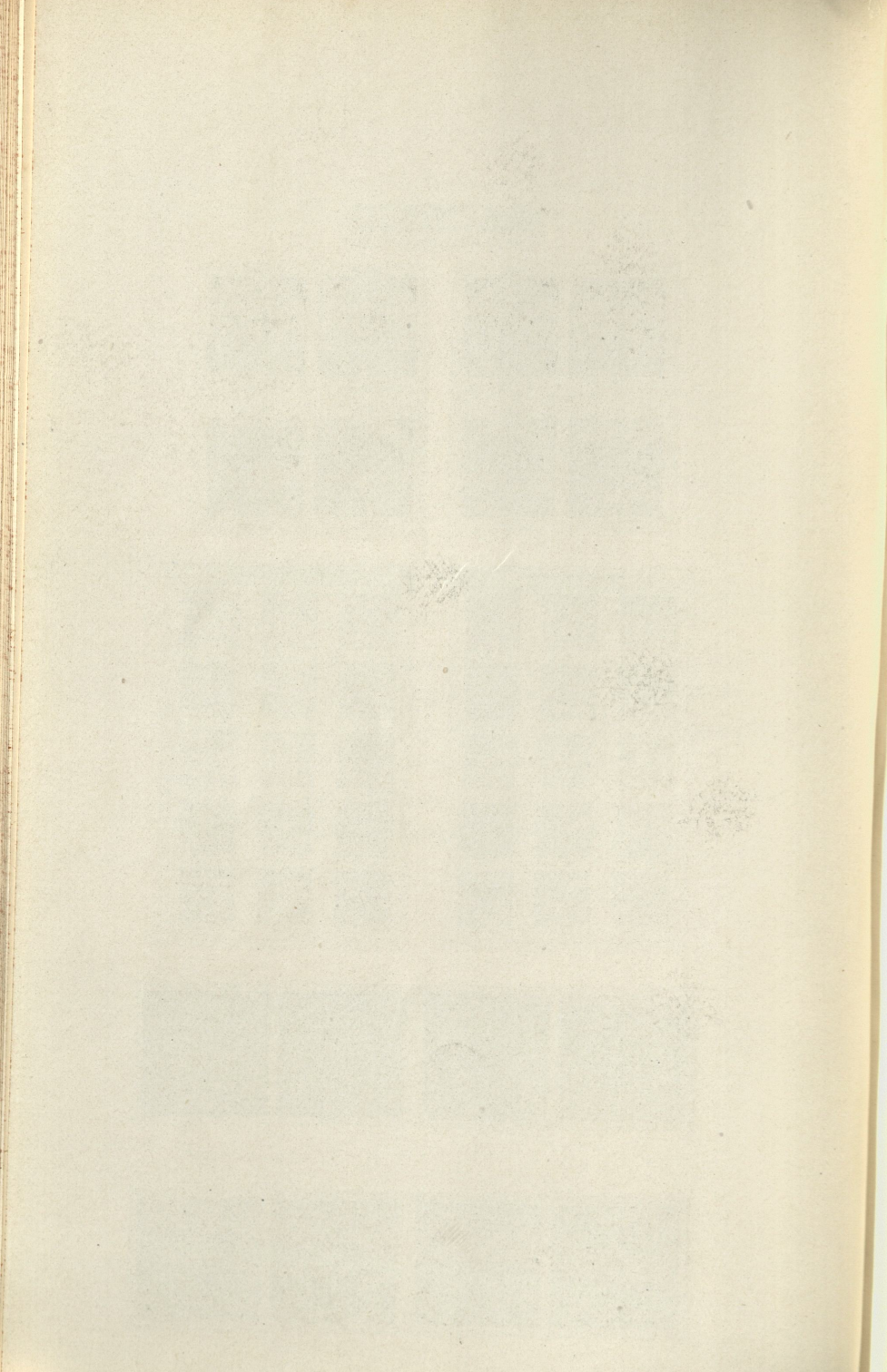On the opposite page are three varieties of Bicircloids.

The first representing Cassini's illustrations of the geocentric orbits of the eight planets known to the ancients;
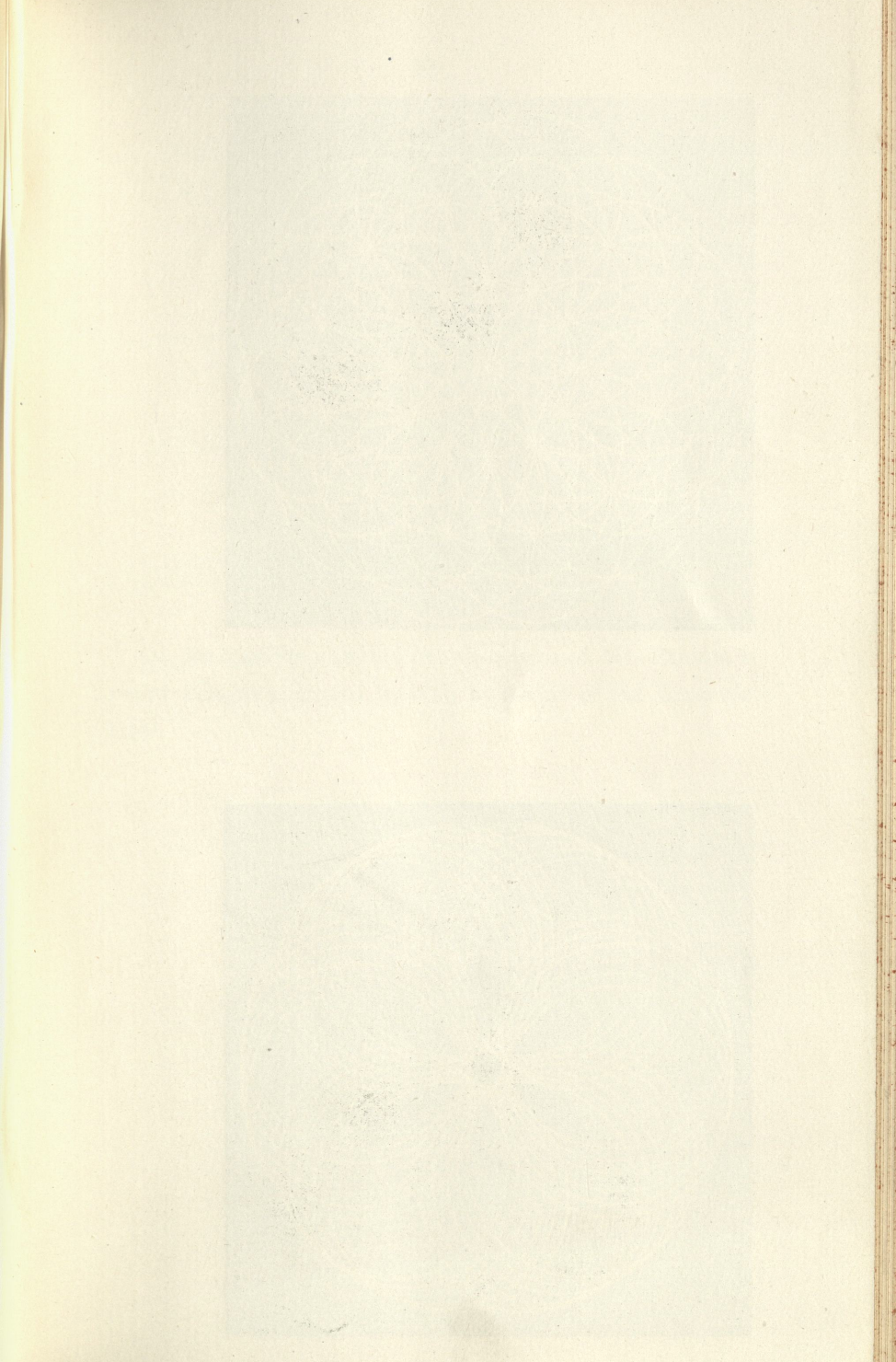
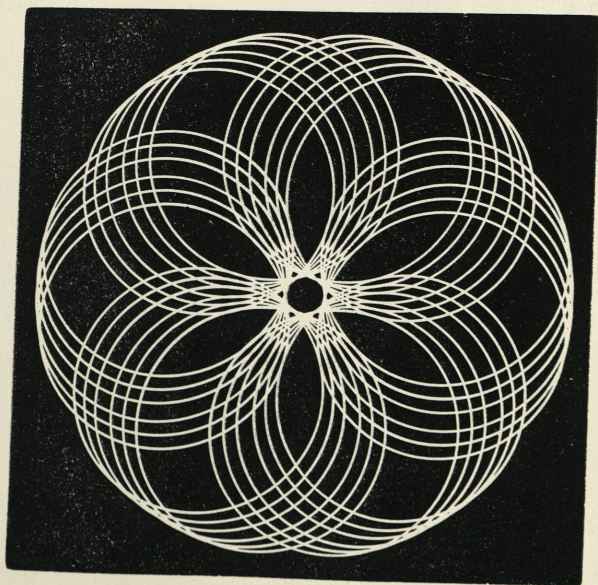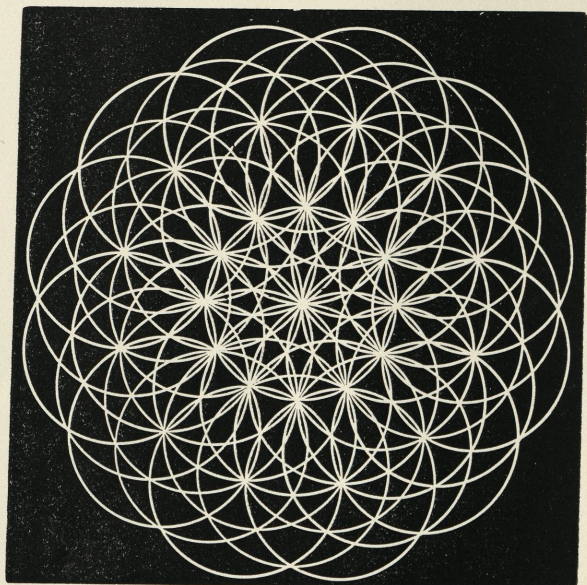The next being varieties of the 26th and 27th Bicircloids, according to Mr. Perigal's classification;

The last being phases of Mr. Perigal's retrogressive Kinematic Parabola, derived from the circle.

MARS.	VENUS.

Velocity-ratio = 1 : 1;
Radial Ratio = 2 : 3.

Velocity-ratio = 8 : 5;
Radial Ratio = 7 : 10.

MERCURY.	JUNO.

Velocity-ratio = 32 : 7;
Radial Ratio = 2 : 5.

Velocity-ratio = 10 : 3;
Radial Ratio = 3 : 8.

JUPITER.	SATURN.

Velocity-ratio = 11 : 1;
Radial Ratio = 1 : 5.

Velocity-ratio = 57 : 2;
Radial Ratio = 2 : 19.

URANUS.	NEPTUNE.

Velocity-ratio = 84 : 1;
Radial Ratio = 1 : 19.

Velocity-ratio = 216 : 1;
Radial Ratio = 1 : 36.

VARIETIES OF 26th BICIRCLOID.

Velocity-ratio, 6 : 1, or 6 : 5, inverse.   Apocentric-radius (D + E) constant = 240.

E : D = 9 : 231 = 1 : 26	E : D = 15 : 225 = 1 : 15	E : D = 23 : 218 = 1 : 10
E : D = 40 : 200 = 1 : 5	E : D = 60 : 180 = 1 : 3	E : D = 80 : 160 = 1 : 2
E : D = 96 : 144 = 2 : 3	E : D = 103 : 137 = 3 : 4	E : D = 107 : 133 = 4 : 5
E : D = 109 : 131 = 5 : 6	E : D = 112 : 128 = 7 : 8	E : D = 120 : 120 = 1 : 1
E : D = 133 : 107 = 5 : 4	E : D = 160 : 80 = 2 : 1	E : D = 192 : 48 = 4 : 1

D = Deferential-radius ; E = Epicyclic-radius.

VARIETIES OF 27th BICIRCLOID.

Velocity-ratio 6 : 1 direct, or 6 : 7 inverse.   Apocentric-radius (D + E) constant = 240.

E : D = 6 : 235 = 1 : 40	E : D = 8 : 232 = 1 : 29	E : D = 30 : 210 = 1 : 7
E : D = 48 : 192 = 1 : 4	E : D = 60 : 180 = 1 : 3	E : D = 80 : 160 = 1 : 2
E : D = 89 : 151 = 3 : 5	E : D = 96 : 144 = 2 : 3	E : D = 108 : 132 = 5 : 4
E : D = 107 : 133 = 4 : 5	E : D = 113 : 127 = 8 : 9	E : D = 120 : 120 = 1 : 1
E : D = 131 : 109 = 5 : 4	E : D = 160 : 80 = 2 : 1	E : D = 192 : 48 = 4 : 1

a = (D + E) = radius of Circle which circumscribes the Curve.

On the opposite page are two specimens of Mr. PERIGAL's circular designs engraved by him, by means of the Geometic Chuck.